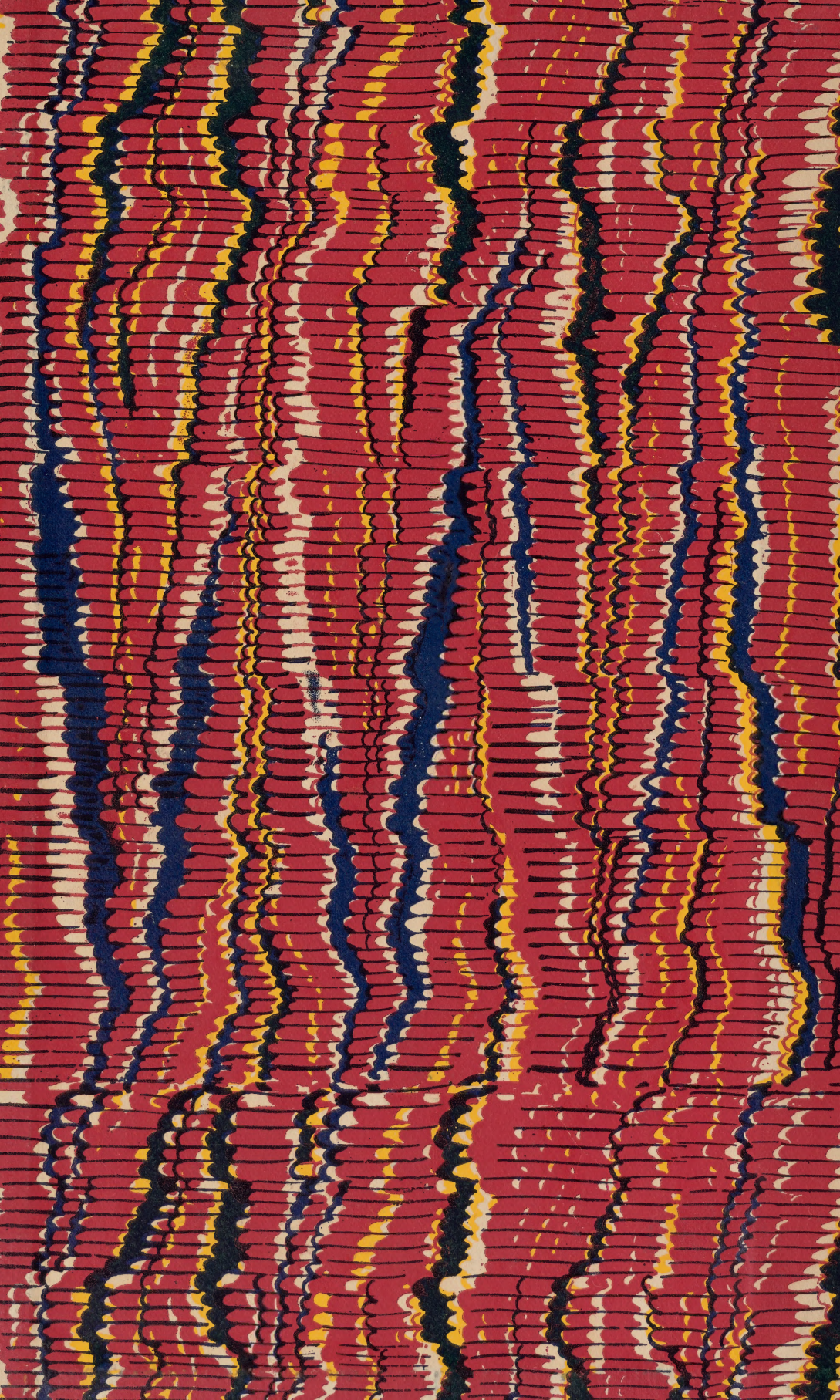

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SPOLIA ZEYLANICA.

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THE COLOMBO MUSEUM,

CEYLON.

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SPOLIA ZEYLANICA.

LUCIOLA NICOLLIERI sp. n. de CEYLAN

PAR E. BUGNION.

(avec deux Planches.)

L'espèce qui fait l'objet de cet article a été trouvée à Ceylan sur la plantation de Talgaswella, à 30 milles environ au nord de Point of Galle.

C'était en Février 1913. Traversant un soir une petite jungle située près du lac, à 1 mille à peu près du bungalow, je pris d'un coup de filet (presque sans y penser) deux Lucioles qui volaient près du sentier. Arrivé à la maison, je vis avec surprise que ces insectes n'appartenaient pas à l'espèce vulgaire (*L. chinensis*), de couleur testacée, si commune à Ceylan, mais que leurs élytres noirs, leur thorax rouge orange, les rapprochaient plutôt de nos *L. italica* et *lusitanica*. Assez intrigué, je me promis d'en capturer un plus grand nombre.

Ce projet fut exécuté le lendemain. Muni d'un filet de gaze, je retournai au même endroit entre 7 et 8 heures du soir et pus, sans m'écarter du sentier, attraper 34 Lucioles qui toutes répondaient au nouveau type.

Mes sujets appartenaient au sexe ♂. Connaissant mal à cette époque le genre de vie des Lucioles, je n'avais pas pensé à rechercher des femelles.*

* Il ressort des observations de Peragallo (1862, p. 621, et 1863, p. 661) que les Lucioles qui volent le soir auprès des arbres sont exclusivement des ♂. Les femelles, beaucoup plus rares, reconnaissables à leurs yeux plus petits, à leur corps plus large et plus dodu, se tiennent au niveau du sol, cachées sous les herbes ou dans les anfractuosités de la surface. C'est là, qu'après avoir volé pendant les premières heures de la nuit, les ♂ les rejoignent un peu plus tard. Des couples peuvent être observés dès 11 heures. La ♀ n'ayant qu'un pouvoir éclairant très faible, les individus de ce sexe sont, dans d'autres circonstances, difficiles à découvrir. Bien que relatives à l'espèce niçoise (*L. lusitanica*), ces indications s'appliquent probablement aux Lucioles en général.

La capture de *L. nicollieri* dans la localité précitée à l'exclusion de *L. chinensis*, est au premier abord difficile à expliquer. La supposition la plus plausible est que notre insecte vole de préférence dans les sous-bois, à l'intérieur de la jungle, tandis que *L. chinensis* fréquente plutôt les endroits découverts. Les naturalistes de passage à Ceylan évitant d'ordinaire de s'attarder dans la forêt après le coucher du soleil, on comprend assez bien que *L. nicollieri* ait échappé à leurs recherches. C'est grâce à une circonstance fortuite, parce que le chemin du retour traversait un bout de jungle, que j'eus l'occasion de découvrir ce nouveau type.*

La faune singhalaise compte une deuxième Luciole assez semblable (élytres et tête noirs, thorax rouge orange avec une tache discoïdale obscure), c'est *L. horni* Bourg. trouvée par le Dr. Horn à Anuradhapura. La description publiée par Bourgeois (1905, p. 128) montre toutefois que *L. horni* diffère par des caractères assez tranchés.

Le type de *L. horni* Bourg. se trouvant à Paris, dans les collections du Muséum, j'ai pu, grâce à l'amabilité de Mr. G. Bénard préparateur, obtenir des indications complémentaires qui, pour ce qui est de la validité de *L. nicollieri*, font tomber les derniers doutes. Voici les principaux passages de la lettre que m'a adressée Mr. Bénard :

" Ayant comparé les deux Lucioles, je puis vous confirmer que votre espèce n'est pas *horni ;* elle diffère de celle-ci par la forme du pronotum et par la coloration. Chez *horni* (sauf les angles antérieurs légèrement arrondis) la forme générale du pronotum est franchement rectangulaire, tandis que, dans votre espèce, elle est trapézoïde.

" Chez *horni*, le pronotum est orné d'une tache noire discoïdale qui laisse de chaque côté une large bordure jaune. Cette bordure n'atteint ni le bord antérieur, ni la base dont elle est séparée par un fin liseré. Chez votre espèce, la coloration du pronotum est d'un jaune orange uniforme.

" Chez *horni*, les élytres sont d'un brun foncé uniforme ; chez votre espèce qui a la même coloration, les élytres sont bordés de jaune.

" Chez *horni*, le dessous du corps est entièrement jaune, tandis que, dans votre espèce, il n'y a que les deux derniers segments qui sont jaunâtres."

---

* Je dédie cette espèce à mon gendre, E. Nicollier, intendant de la plantation de Talgaswella, en souvenir de la bonne hospitalité qu'il m'a donnée au bungalow.

Description du ♂ (Pl. I., figs. 1 et 2).

Longueur variable : 5-8 mm.

Noir, avec le prothorax, le scutellum, le bout et le bord des élytres, les hanches antérieures et médianes, ainsi que le pourtour du mésosternum, d'un rouge orange.—Les deux derniers segments de l'abdomen d'un jaune testacé brillant, tranchant vivement sur la couleur noire des anneaux qui précèdent. Pattes brunes, avec la face inférieure des cuisses et le bord externe des tibias rougeâtres.—Yeux grands, arrondis, d'un noir opaque, plus rapprochés l'un de l'autre au côté ventral qu'au côté dorsal.

Front largement excavé, couvert de rugosités serrées, noir avec des poils blanchâtres assez courts et clairsemés. Antennes filiformes, noires, velues, insérées près l'une de l'autre. Onze articles : le 1er deux fois plus long que le 2e, les 3e et 4e un peu plus longs que le 2e, les suivants un peu plus courts que le 4e, deux fois environ plus longs, que larges. Pronotum transverse, deux fois plus large que long, convexe, avec un sillon médian et une impression transverse au devant du scutellum, de couleur rouge orange avec un liseré noirâtre le long du bord antérieur ; son bord antérieur légèrement arrondi, avec sa partie médiane proéminente, ses bords latéraux à peu près droits, son bord postérieur profondément bisinué, ses angles antérieurs obtus, ses angles postérieurs acuminés et déjetés en arrière.

Surface du thorax marquée de points serrés arrondis, creusés en forme de cupules, avec un poil oblique inséré sur le bord de chaque point (fig. A).

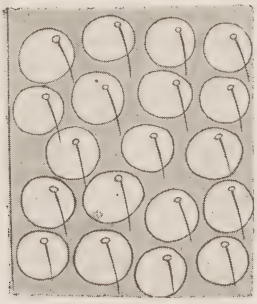

Fig A.—Luciola nicollieri ♂. Portion du tégument du pronotum. Préparation au baume. × 156.

Scutellum de même couleur que le thorax, ponctué de même, triangulaire avec le bout arrondi.—Elytres à peine dilatés d'avant en arrière, ensemble trois fois environ plus longs que larges, les épaules assez saillantes, le bord externe, au niveau de l'épaule, replié en dessous et dilaté, les bouts postérieurs insensiblement rétrécis et arrondis. A leur surface se voient 3 lignes élevées assez distinctes (une 4 ème obsolète) et, dans les intervalles, des points enfoncés plus distants que les points thoraciques, disposés en séries longitudinales assez régulières. Poils jaunâtres inclinés d'avant en arrière, plus longs et plus serrés vers le bout postérieur. Abdomen dorsal, composé de 7 segments ; les 4 premiers brun foncé, les 3 derniers testacés. Abdomen ventral formé de 6 segments, les 4 premiers brun foncé, les deux derniers testacés et transparents, recouvrant des organes lumineux en forme de plaques.* Dessous du corps finement ponctué, avec une pubescence grisâtre courte et serrée.

Tibias légèrement incurvés, garnis sur le bord externe d'une rangée de poils assez serrés. Premier article des tarses aussi long que 2 + 3; 3 deux fois plus court que 2; le 4e creusé d'une rainure destinée à loger la base du 5e; le 5e étroit, comprimé, avec deux petits ongles un peu renflés à leur base.

---

* H. v. Kiesenwetter (1863, p. 460) dit au sujet de l'abdomen de la Luciole : " Le côté ventral de l'abdomen se compose chez le ♂ de 6 segments. Le dernier segment, allongé, terminé en pointe, étant souvent transparent, on croit voir un 7e segment qui en réalité n'existe pas." Cette dernière assertion n'est pas exacte. Le segment que l'on voit par transparence est le 7ème tergite. Il y a en effet chez la Luciole ♂, 7 tergites abdominaux et seulement 6 sternites visibles. Quelques pièces accessoires, attenantes à l'armure génitale, dérivées des segments 7.8 et 9, sont, à l'état de repos, retirées a l'intérieur.. Chezla ♀, le côté ventral de l'abdomen est formé de 7 segments. Peut-être même pourrait-on considérer l'oviscapte comme répondant à deux anneaux supplémentaires.

Chez *Lampyris*, le côté ventral de l'abdomen a 8 segments chez la ♀ et 7 seulement chez le ♂. Les écharpes lumineuses de la ♀ se trouvent sur la face ventrale des segments 6 et 7. Chez les larves (*Luciola*, *Lampyris*, *Phausis*), l'abdomen a neuf articles dans les deux sexes, sans compter un 10e anneau atrophié.

Ceylan, Talgaswella, district d'Elpitiya.

Diffère de *L. horni* Bourg. par ses antennes entièrement noires, son prothorax d'un jaune orange uniforme, ses élytres bordés de jaune orange, le dessous de l'abdomen, à l'exception des deux derniers segments, de couleur foncée.

Distinct de *L. italica* L. par sa forme moins allongée, sa ponctuation plus fine, son pronotum plus court (relativement plus large) avec les angles postérieurs plus déjetés en arrière, ses pattes plus foncées, ses élytres bordés de jaune.

L. lusitanica Charp. diffère de *nicollieri* par sa taille plus forte (11 mm.), son thorax plus large (plus transverse), avec le bord postérieur plus distinctement bisinué, par ses élytres entièrement noirs. Les deux derniers articles ventraux de l'abdomen (♂) ne sont pas testacés comme chez *nicollieri*, mais d'un jaune soufre pâle. Le 3e article des palpes labiaux est découpé en 5 festons (3 chez *nicollieri*). On constate, en examinant au microscope le pronotum des deux espèces, que les points cupuliformes sont, chez *lusitanica*, beaucoup plus écartés (fig. B).

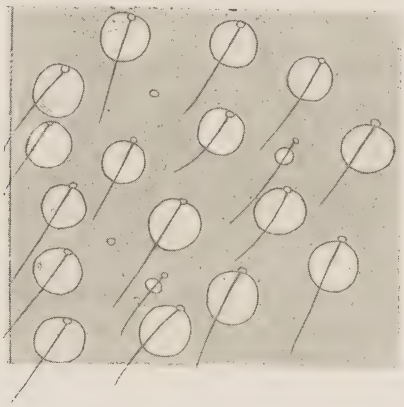

Fig. B.—Luciola lusitanica ♂. Portion du tégument du pronotum. Préparation au baume. × 156.

Structure de la tête.

Les yeux de la Luciole ♂ étant très gros, il n'y a, au côté ventral, qu'un étroit espace réservé aux pièces buccales et aux articulations des antennes (figs. 3 et 4). Les parties buccales sont, en suite de ces dispositions, difficiles à préparer. Le procédé qui m'a le mieux réussi consiste à sectionner la tête en deux dans un plan horizontal, et après avoir éclairci dans la potasse caustique, à monter sur le porte-objet les deux moitiés de la capsule. L'avantage de cette méthode est de laisser les pièces *in situ* et d'en obtenir une vue d'ensemble par dessus et par dessous.

Voici, en quelques lignes, la technique que je conseille.

Il faut prendre de préférence des sujets conservés dans l'alcool. Si l'on n'a que des exemplaires secs, on doit préalablement les ramollir dans l'eau chaude.

L'insecte ayant été placé le ventre en haut sur la platine du porte-loupe, on le maintient avec l'index gauche, en laissant la tête seule à découvert. On opère sous la loupe à un grossissement de 8 à 10. La distance focale doit être assez grande pour que l'on puisse passer l'index sous la lentille et manoeuvrer le rasoir commodément.

Tout étant préparé comme il vient d'être dit, on prend le rasoir de la main droite, l'applique un peu en avant de l'insertion des antennes et, pressant doucement, fait pénétrer la lame de façon à sortir sur la face opposée au niveau du trou occipital. C'est surtout la moitié ventrale qu'il importe d'examiner. La coupe, plongée dans la solution potassique, est chauffée pendant quelques instants dans le but de chasser les bulles d'air. Après une immersion dans l'eau qui peut durer 1 à 2 heures, on traite par l'alcool, l'essence de girofle, le xylol ou l'huile de cèdre, et monte dans le baume du Canada.

Examinons d'abord la coupe représentée fig. 3. Les yeux très volumineux ♂ ne laissent entre deux qu'une bande étroite. Allant d'avant en arrière, on distingue les parties suivantes :

(1°) Le front légèrement creusé ou ensellé ; (2°) les cadres articulaires des antennes, ovalaires, presque justaposés, séparés l'un de l'autre par une lame très étroite ; (3°) l'épistome, raccourci dans le sens antéro-postérieur, terminé par un bord concave sur lequel est articulé le labre ; (4°) le labre, relativement petit, limité par un bord antérieur à peu près droit,

enserré entre les parties basales des mandibules ; (5°) les mandibules courbées en forme de faucilles, croisées l'une par dessus l'autre dans la position fermée ;* (6°) l'échancrure gnathale limitée des deux côtés par les apophyses mandibulaires, en arrière par le bord antérieur du basilaire ; (7°) dans le fond de l'échancrure, la saillie médiane destinée à l'insertion du labium et les crochets articulaires auxquels les cardos des maxilles sont attachés.

Le labium et les maxilles (non représentés sur la fig. 3) seront étudiés en s'aidant d'autres figures.

Un détail intéressant à relever est que l'échancrure gnathale aboutit en avant à une 2e échancrure (*éch. frontale*) dirigée en sens inverse. A droite et à gauche de l'épistome et du labre se voient deux apophyses assez épaisses (*ap. frontales*) qui rejoignant les apophyses mandibulaires (soudées à celles-ci), contribuent à former les cavités articulaires des mandibules.

On voit encore qu'en s'unissant bout à bout, les quatre apophyses forment un cercle complet (*anneau oral*) dans lequel sont logées les pièces buccales. La partie postérieure de l'anneau (désignée sous le nom d'échancrure gnathale) est exactement remplie par le labium et les stipes, la partie antérieure par l'épistome et le labre, la partie moyenne par les mandibules. Celles-ci, très proéminentes, s'ouvrent et se ferment en avant des autres pièces.

Le *labre*, légèrement rétréci dans sa partie postérieure, est limité en avant par un bord à peu près droit, portant quelques poils clairsemés. Chez *L. lusitanica* le labre est surmonté d'une expansion membraneuse qui, proéminant en avant, forme, dans l'intervalle des mandibules, un prolongement triangulaire. Une disposition à peu près semblable s'observe également chez *Lampyris noctiluca*.

Les *mandibules* qui, chez la plupart des Coléoptères, Orthoptères, &c., s'articulent par des articulations doubles (ventrales et dorsales) sont, chez *Luciola*, portées par un condyle unique.

---

* Des mandibules courbées en forme de faucilles caractérisent également le g. *Phausis*. Chez *Lampyris* au contraire (*L. noctiluca*), les mandibules sont presque droites avec le bout moins acéré.

La courbure des mandibules est régulière, leur pointe assez aiguë. Leur bord externe est, dans sa moitié postérieure, garni de poils obliques, dirigés d'arrière en avant ; leur bord interne est glabre. A l'angle postéro-interne se trouve une apophyse assez forte sur laquelle le tendon du fléchisseur est inséré.

Chez *L. lusitanica*, le bord interne des mandibules porte près de la base une saillie garnie de poils, rappelant une disposition qui s'observe chez les larves des *Lampyris* et des *Phausis*. Une saillie analogue n'existe pas chez *L. nicollieri* (adulte).

La fig. 4 diffère de la précédente en ce que (le rasoir ayant passé plus en arrière), elle montre le basilaire entier avec les parties adjacentes de la capsule. On a représenté au surplus le mentum , les cardos et une partie des stipes.

Le *basilaire* (aussi appelé *gula*) est la partie de la capsule cranienne comprise entre le trou occipital et l'échancrure gnathale. Destiné à supporter le labium, il répond, parait-il, au sternite du 6ème zoonite de la tête (z. *labial*). Libre chez les Orthoptères (*Blatta*, *Mantis*, &c.), le basilaire est, chez les Coléoptères, toujours soudé aux parties qui l'avoisinent.

Chez *Luciola*, le basilaire est allongé et, d'arrière en avant, graduellement rétréci. Son bord postérieur (confinant au trou occipital) est régulièrement arqué. Son extrémité antérieure forme, chez *nicollieri*, un court pédicule qui, proéminant dans l'échancrure, porte l'insertion du labium sans aucune articulation interposée.

Des deux côtés se voient deux travées chitineuses assez épaisses, de couleur foncée, les *baguettes juxta-basilaires*, dont les bouts antérieurs, proéminents sur le bord postérieur de l'échancrure, forment les petites saillies auxquelles les cardos sont attachés. Destinées à porter les articulations des maxilles, les baguettes juxta-basilaires appartiennent théoriquement au 5ème zoonite de la tête (z. *maxillaire*) ; les apophyses mandibulaires appartiennent au 4ème.

Le *labium* (fig. C) est représenté par une lame oblongue, élargie en avant, en partie transparente (de structure molle) en partie chitinisée et rembrunie. Il y a une plaque

chitinisée postérieure répondant au mentum (1ère pièce du labium) et deux plaques antérieures répondant au palpigère (2ème pièce), plus exactement aux *squamæ palpigeræ* (décrites par Ganglbauer chez *Calosoma*).

Le *mentum* est une petite plaque brune, arrondie sur les côtés, velue sur sa face libre, avec le bout postérieur distinctement échancré. C'est à son bord postérieur qu'est fixée la tige au moyen de laquelle le labium est attaché au basilaire. (Cette tige, très étroite chez *L. Nicollieri*, est, chez *L. lusitanica*, notablement plus large).

Les *squamæ palpigeræ* sont deux plaques de forme oblongue, légèrement rembrunies, velues sur leur face libre, prolongées en arrière par deux cornes atténuées en pointes, portant en avant les articulations des palpes.

Légèrement rétréci à l'endroit où les palpes sont insérés, le labium se termine par deux petits appendices qui vraisemblablement représentent les *lobes terminaux internes*, désignés parfois sous le nom de *glosses*. Ces lobes, atténués en pointe, juxtaposés l'un à l'autre, richement garnis de petits poils, diffèrent suivant celle des faces qui se présente. Observés par dessous, les dits lobes apparaissent comme deux pièces bien détachées, limitées en arrière par les insertions des palpes, tandis que vus d'en haut, ils montrent simplement deux lèvres continues avec les bords latéraux du palpigère et richement garnies de poils. Entre les deux lèvres se trouve au côté dorsal une gouttière destinée à la succion.

Très étroite dans sa partie antérieure, la gouttière du labium s'élargit brusquement dans sa partie moyenne, puis poursuivant son trajet, va s'ouvrir dans le pharynx.

Le *palpe labial*, composé de 3 articles comme chez les Lampyrides en général, se distingue en ceci que l'article terminal, aplati et élargi, de couleur pâle, offre sur son bord libre trois petites dents (festons) séparées par des échancrures bien apparentes.*

* Les festons qui distinguent le 3e article du palpe labial dans le g. *Luciola* ont été signalés par v. Kiesenwetter 1863, p. 459.

Plus dilaté chez *lusitanica*, le 3e article des palpes labiaux offre, dans cette dernière espèce, cinq dents marginales mieux découpées. Observées au microscope à un grossissement de 70 à 100, ces dents montrent une extrémité tronquée, terminée, semble-t-il, par une membrane amincie ou par un pore. A l'opposé des articles 1 et 2 qui sont hérissés de soies rigides, le 3e article est garni à sa surface de poils fins et clairsemés.

Les *maxilles* comprennent les parties suivantes : (1°) la pièce articulaire, (cardo) ; (2°) la tige (stipes) ; (3°) le lobe terminal interne (lacinia) ; (4°) le lobe terminal externe (galea) ; (5°) le palpe.

Les cardos de la Luciole ont une disposition particulière qui, à ma connaissance, n'a pas encore été décrite. Au lieu d'être, comme chez les Coléoptères en général, placés en arrière des stipes, ils sont d'ordinaire superposés à ces derniers, au côté dorsal.

Observé dans cette position, le cardo offre un bout postérieur tronqué attaché au bord postérieur du stipes ; son bout antérieur porte d'autre part deux prolongements en forme de cornes, dont l'un, interne, s'articule sur le bord de l'échancrure gnathale au niveau de la saillie dejà décrite, tandis que l'autre, externe, donne insertion aux muscles.

Il y a toutefois une position inverse, dans laquelle le cardo est retourné. J'ai sous les yeux une préparation empruntée à *L. lusitanica* dans laquelle le cardo gauche s'est porté en avant, entraînant la maxille entière, tandis que la maxille opposée est en retrait. Je conclus de ces faits que le cardo de la Luciole joue le rôle d'un levier mobile. Basculant sur la saillie articulaire qui le supporte, il transmet à la maxille un mouvement alternatif de pro et de rétropulsion. Les déplacements latéraux, trés réduits chez ces insectes à cause de l'étroitesse de l'espace dévolu aux pièces buccales, seraient remplacés par un mouvement de va et vient. Peut-être en mettant l'insecte en plein soleil (la Luciole étant collée sur le porte-objet le ventre en haut) pourrait-on réussir à observer sur le vivant ce singulier mécanisme.*

* Des dispositions analogues existent, d'après mes observations, dans les g. *Phausis* et *Lampyris*.

Fig. C.—Luciola nicollieri ♂. le basilaire isolé, avec le labium et les maxilles. × 56.

1—basilaire ; 2—baguettes juxta basilaires ; 3—épaississement chitineux représentant le menton ; 4—partie membraneuse ; 5—écailles palpigères ; 6—lobes terminaux du labium ; 7—palpes labiaux ; 8—cardo de la maxille ; 9—stipes ; 10—palpifer ; 11—lacinia ; 12—galea ; 13—palpe maxillaire.

Un fait intéressant à noter est que les mouvements alternatifs de pro et de rétropulsion affectant à la fois le labium et les maxilles s'observent également chez les larves des Lampyrides. L'appareil maxillo-labial se retire en arrière, de manière à degager les mandibules, au moment où celles-ci s'enfoncent dans la chair de l'Escargot, tandis qu'il se porte en avant lorsqu'il doit coopérer à la succion du bouillon nutritif.*

Observés in situ, les stipes se montrent au premier abord sous forme de deux lames étroites, limitées par des bords rembrunis et presque droits. Ce n'est là toutefois qu'une apparence dûe à un effet de raccourci. Enserrées dans un étroit interstice (fig. 4) les maxilles ne sont pas posées à plat, mais dans une direction oblique par rapport au plan frontal. Il faut les isoler, pour pouvoir juger de leur vraie forme.—Etalé sur le porte-object (fig. C) le stipes se montre composé de deux parties, une postérieure étroite, une antérieure élargie. La partie postérieure, à peu près quadrilatère, a sur sa face libre quelques poils clairsemés. La partie antérieure montre au niveau de l'angle externe la lame rembrunie, hérissée, de nombreux poils, généralement désignée sous le nom de *palpifer*. Destinée à porter l'articulation du palpe, cette lame peut être comparée à une écaille qui embrasserait le bord externe du stipes. Développée surtout au côté dorasl, elle n'offre au côté ventral qu'un rebord étroit. Sur le bord interne du stipes (à peuprès à mi-longueur de la maxille) se trouve une épine assez saillante qui, lorsqu'on observe les pièces buccales in situ, proémine en-dessous des squames palpigères. Au même niveau se voit un arc chitineux qui, coupant l'angle antéro-interne du stipes, surmonté d'une houppe de poils courts, représente à mon sens, la partie postérieure du lacinia.

* La larve de la Luciole (L. *lusitanica*) a des mandibules canaliculées entiérement semblables à celles des *Lampyris* et des *Phausis*. Ou peut inférer de cette observation que ladite larve se nourrit elle aussi, aux dépens de petits mollusques (Escargots et Limaces), La Luciole adulte ne prend, pavait-il pas d'aliments.

Le reste du lacinia se trouve, comme le montre la figure C, en avant de cette pièce, encastré dans une échancrure du galea. Le lobe terminal de la maxille serait, d'après cette manière de voir, constituè par deux pièces juxtaposées, l'une plus étendue atténuée en pointe, richement couverte de poils, répondrait au galea, l'autre plus petite, placée à l'angle interne, représenterait le lacinia. Le palpe, bien développé, de couleur foncée, est composé de quatre articles. Le 1er, assez étroit, est deux fois plus long que large ; le 2ème deux fois plus grand que le premier ; le 3ème court et épais ; le 4ème beaucoup plus grand, renflé, terminé en forme de cône ; tous quatre modérément garnis de poils.

Les traits qui caractérisent la tête de la Luciole sont en résumé :

(1°) La grosseur des yeux, surtout dans le sexe mâle, et l'étroitesse de l'espace (interoculaire) réservé aux pièces buccales ; (2°) la présence d'une échancrure frontale qui, venant à la rencontre de l'échancrure gnathale, forme avec celle-ci un anneau complet* ; (3°) l'absence d'une pièce prébasilaire ; (4°) la délimitation imparfaite du mentum et du palpigère, ces deux pièces, incomplètement chitinisées, étant unies l'une à l'autre par une partie membraneuse ; (5°) des cardos disposés de telle manière que les maxilles peuvent, au gré de l'animal, avancer ou reculer ; (6°) des mandibules portées par un condyle unique, de part et d'autre ; (7°) la position proéminente des mandibules et l'absence, en dessous du labre, d'une fente (sinus) destinée à les loger.

Comparées à celles de *L. lusitanica*, les parties buccales de *L. Nicollieri* se distinguent par les caractères suivants :

(1°) Le labium est uni au basilaire par une bandelette étroite formant une espèce de pédicule ; (2°) l'article terminal du palpe labial forme trois festons, au lieu de cinq ; (3°) les

* Une disposition semblable s'observe également chez *Lampyris* et chez *Phausis*, mais avec cette différence que l'échancrure frontale est moins profonde.

Un anneau oral complet existe chez certains Hyménoptères (famille des *Braconides*, groupe des *Dorycetes*), désignés pour ce motif sous le nom de *Cyclostomes*.

cardos sont relativement plus courts ; (4°) l'épine qui surmonte le bord interne du stipes ne proémine que faiblement ; (5°) le labre est limité par un bord antérieur à peu près droit ; (6°) le bord interne des mandibules ne porte, près de sa base, aucune saillie garnie de poils.

Index Bibliographique.

1735. *Linné* (*C.*). Systema naturæ, I. 2, p. 645. (Lampyris italica et chinensis).

1833. *Laporte de Castelnau* (*F. L.*). Essai d'une révision du g. Lampyris. Ann. Soc. ent. France, p. 146. (genre Luciola.)

1842. *Charpentier*. Horæ entomologicæ, VI., p. 194, fig. 4. (Luciola lusitanica.)

1858. *Walker* (*F.*). Characters of some apparently undescribed Ceylon insects. Ann. Mag. Nat. Hist., Vol. II. (3rd ser.), p. 202.

1862, 1863. *Peragallo* (Al). Notes pour Servir à l'histoire des Lucioles. Ann. Soc. ent France (4), II., p. 621 ; III., p. 660.

1862. *Mulsant*. Mollipennes. Ann. Soc. Lin. Lyon, p. 179 Luciolaires, et note Suppl., p. 593.

1863. *Kiesenwetter* (*H. von*). Naturg. der Insecten Deutschlands, IV., p. 458. Luciolidæ.

1880. *Gorham* (*Rev. H. S.*). On the structure of the Lampyridæ with reference to their phosphorescence. Trans. entom. Soc., London.

1884. *Olivier* (*Ernest*). Révision des Lampyrides. L'Abeille, p. 47. (*Luciola.*)

1885. —Ann. Mus. civ. Genova, p. 359. (*Luciola chinensis.*)

1886. *Emery* (*C.*). La luce negli amori delle Lucciole. Bull. Soc. ent. Italiana. Anno XVIII.

1905. *Bourgeois* (*Jules*). Voyage du Dr. W. Horn à Ceylan. Ann. Soc. ent. France, p. 128. (Descr. de *Luciola horni.*)

1909. —Voyage du Dr. E. Bugnion à Ceylan. Ann. Soc. ent. France, p. 430.

1916. *Bugnion* (*Ed.*). Les insectes phosphorescents. Bull. de a Soc. Murithienne du Valais. Sion, p. 121. (Lucioles de Ceylan.)

1921. —La Biologie de la Luciole (*Luciola lusitanica*). Revue d' Hist. nat-appliquée. No. 1. (janvier).

Explication des Planches.

Planche I.

Figs. 1 et 2.—Luciola nicollieri, sp. n. de Ceylan. L'insecte ♂ grossi 7½ fois.*

Planche II.

Fig. 3.—Luciola nicollieri ♂. La téte sectionnée en deux moitiés. La moitié ventrale éclaircie dans la potasse caustique. Préparation au baume. × 45.

1—tigelle articulaire de l'antenne; 2—épistome; 3—apophyse frontale; 4—labre; 5—mandibule; 6—apophyse mandibulaire; 7—échancrure gnathale; 8—articulation du cardo.

N.B.—Les maxilles et le labium ont été détachés.

Fig 4.—Luciola nicollieri ♂. La téte, sectionnée en deux moitiés. La moitié ventrale éclaircie dans la portasse caustique. Préparation au baume. × 45.

1—basilaire ou gula; 2—baguette juxta-basilaire; 3—le stipes de la maxille dans sa position habibuelle [Le stipes opposé a été représenté, en propulsion, d'après une préparation empruntée à *L. lusitanica*]; 4—apophyse mandibulaire; 5—partie membranense qui unit le mentum au palpigére; 6—articulation de la mandibule; 7—apophyse frontale; 8—épistome; 9—bord de la fossette antennaire.

N.B.—Les mandibules n'ont pas été dessinées; non plus que les pièces terminales des maxilles et du labium.

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* Cette planche a été dessinée et coloriée à l'aquarelle par Mme Paul Robin, 103 Avenue de Villers, Paris.

Fig. 1.

Fig. 2.

LUCIOLA NICOLLIERI sp. n. ♂.

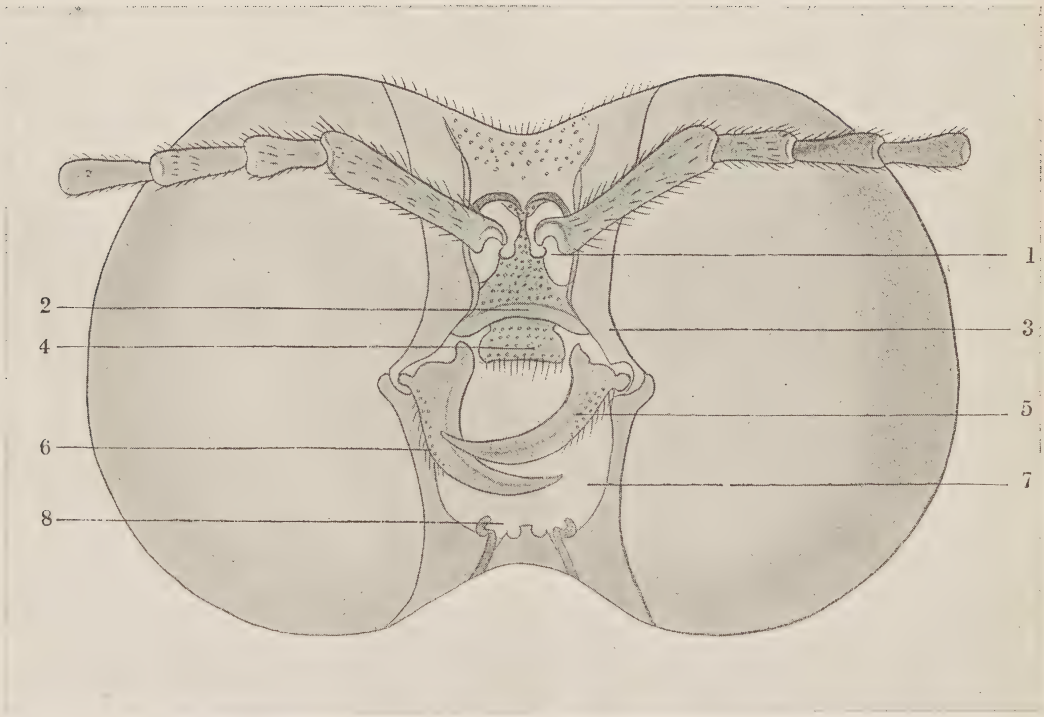

Fig. 3.

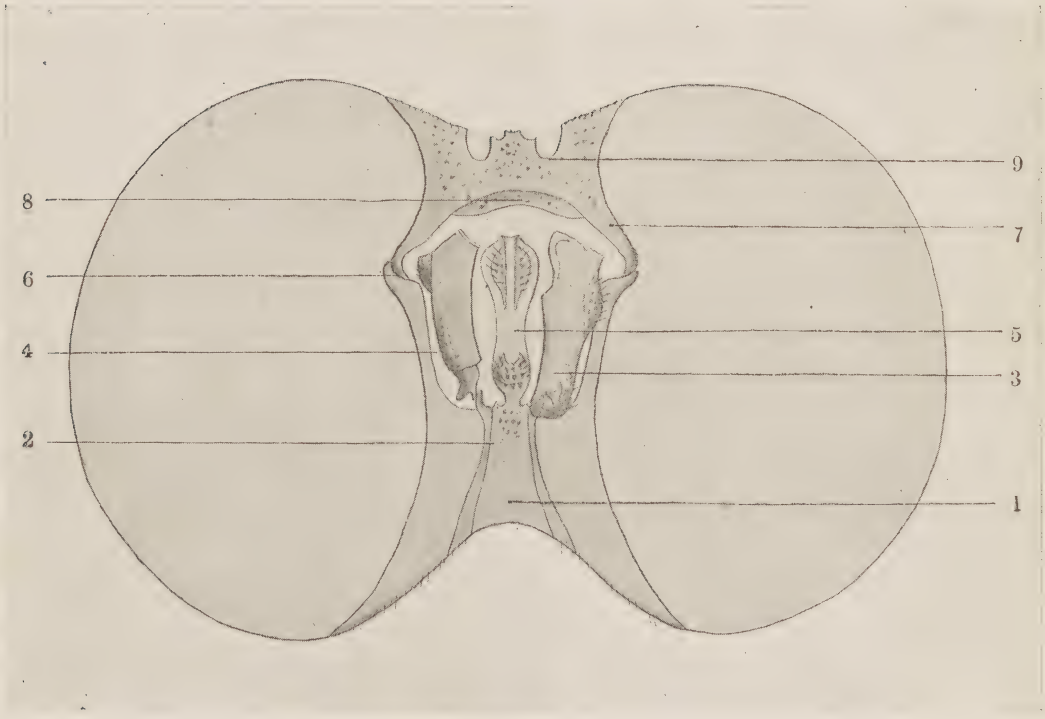

Fig. 4.

LUCIOLA NICOLLIERI, sp. n. ♂.

A PRELIMINARY ACCOUNT OF THE LAMELLICORNIA COLLECTED IN CEYLON BY PROF. E. BUGNION DURING THE YEARS 1906 TO 1913.*

By Prof. Joseph J. E. Gillet, Brussels, Belgium.

THROUGH Prof. Bugnion's courtesy I have been able to examine numerous specimens of lamellicorn beetles brought home by him after several visits to Ceylon. I give below a list of the species I have identified, with references to the original descriptions. As soon as I have brought together sufficient material, I hope to publish in "Spolia Zeylanica" a monograph of the Lamellicornia of Ceylon :—

Sub-family **Coprinæ.**

Genus Scarabæus.

gangeticus Castelnau (1840), Hist. Nat. Col. II., p. 64.
Balapitiya (low-country). A single specimen taken when flying.

Genus Gymnopleurus.

melanarius Harold (1867), Coleopt. Hefte, I., p. 76.
var. æthiops Sharp (1875) Coleopt. Hefte, XIII., p. 34.
Puwakpitiya (Kelani Valley).

miliaris Fabricius (1775), Syst. Entom. App., p. 817.
Puwakpitiya. Several specimens.

koenigi Fabricius (1775), Syst. Entom., p. 29.
Balapitiya. Numerous specimens found in human excrement.

* Lists concerning other groups of Ceylon Insects have been published by Bourgeois (Malacodermes and Lymexylonidæ) in Ann. Soc. ent. France, 1909, pp. 423–438, with a colour plate ; Forel (Formicidæ) in Bull. Soc. vand. Sc. Nat. (Lausanne), Vol. 44, pp. 1–23, 1908, and Vol. 45, pp. 392–407, 1909 ; and by Bugnion (Termites de Ceylan), Bull. du Museum, Paris, 1914, 37 pages and 8 plates.

Genus Sisyphus.

HIRTUS Wiedeman (1823), Zool. Mag., II., 1, p. 24.
Puwakpitiya, Seenigoda. Taken in numbers in cow dung.

Genus Catharsius.

MOLOSSUS Linnaeus (1758), Syst. Nat. ed. X., I., p. 347.
Puwakpitiya, Ambalangoda. Common in cow dung (low-country).

PITHECIUS Fabricius (1775), Syst. Entom., I., p. 21.
Puwakpitiya, Ambalangoda, Talgaswella, Peradeniya. Numerous specimens found in cow dung.

CAPUCINUS Fabricius (1781), Spec. Ins., I., p. 25.
Ambalangoda, Talgaswella.

Genus Copris.

REPERTUS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 208.
Puwakpitiya, Ambalangoda, Peradeniya. In cow dung. Taken in numbers.

TAPROBANUS Gillet (1910), Notes Leyden Mus., XXXII., p. 9.
Precise locality not recorded. Two specimens.

SIGNATUS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 208.
Puwakpitiya, Upper Kelani, Peradeniya.

Genus Onitis.

DISTINCTUS Lansberge (1875), Ann. Soc. Ent. Belgique, XVIII., p. 138.
Puwakpitiya, Ambalangoda. Common in low-country.

Genus Drepanocerus.

SETOSUS Wiedeman (1823), Zool. Mag., II., 1, p. 19.
Puwakpitiya, Seen goda. Numerous specimens in excrement.

Genus Oniticellus.

RHADAMISTUS Fabricius (1775), Syst. Entom. I., p. 22.
Hambantota. Captured by W. Morton.

Genus Caccobius.

VULCANUS Fabricius (1801), Syst. El., I., p. 41.
var. *indicus* Harold (1867) Coleopt. Hefte., II., p. 12.
Puwakpitiya. Taken in numbers.
ATERRIMUS Harold (1867), Coleopt. Hefte, II., p. 9.

Genus Onthophagus.

PUSILLUS Fabricius (1798), Ent. Syst. Suppl., p. 36.
Puwakpitiya.
CENTRICORNIS Fabricius (1798) Ent. Syst. Suppl., p. 33.
Puwakpitiya.
PARVULUS Fabricius (1798) Ent. Syst. Suppl., p. 36.
Trincomalee, Bandarawela, Puwakpitiya.
POLITUS Fabricius (1798), Ent. Syst. Suppl., p. 35.
Trincomalee. A single specimen.
FUSCOPUNCTATUS Fabricius (1798), Ent. Syst. Suppl., p. 36.
Low-country (no locality recorded). A single specimen.
MILITARIS Boucomont (1914), Ann. Mus. Civ. Genova (3), VI., p. 234.
Puwakpitiya, Mount Lavinia. Some specimens only.
QUADRIDENTATUS Fabricius (1798), Ent. Syst. Suppl., p. 34.
Peradeniya. Two specimens.
FURCULUS Fabricius (1798), Ent. Syst. Suppl., p. 33.
Trincomalee, Puwakpitiya. Taken in numbers.
PYGMÆUS Schaller (1783), Abh. Hallisch. n. Ges., I., p. 239.
Galle, Seenigoda, Puwakpitiya. Taken in numbers.
DIMINUTIVUS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 208.
Puwakpitiya. A single specimen.
DAMA Fabricius (1798), Ent. Syst. Suppl., p. 32.
Puwakpitiya, Ambalangoda, Point de Galle, Peradeniya.
Very common and widely distributed species.
SPINIFEX Fabricius (1781), Ipec. Ins., I., p. 29.
Puwakpitiya. Two specimens.
RECTECORNUTUS Lansberge (1883), Notes Leyden Mus., V., p. 49.
Puwakpitiya.

CERVUS Fabricius (1798), Ent. Syst. Suppl., p. 31.
Puwakpitiya, Mount Lavinia, Ambalangoda. Taken in considerable numbers.

TARBATUS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 209.
Puwakpitiya, Peradeniya. Numerous specimens found in cow dung.

UNIFASCIATUS Schaller (1783), Abh. Hallisch. n. Ges., I., p. 240.
var. PROLIXUS Walker (1858) Ann. Mag. Nat. Hist. (3), II., p. 208.
Puwakpitiya, Peradeniya, Talgaswella. Taken in numbers.

DIFFICILIS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 209.
Trincomalee. Numerous specimens in cow dung.

BONASUS Fabricius (1775), Syst. Entom. I., p. 23.
Trincomalee. Taken in some numbers.

CRYPTOGENUS Boucomont (1914), Ann. Mus. Civ. Genova (3), VI., p. 216.
Puwakpitiya. A single specimen.

TRITINCTUS Boucomont (1914), Ann. Mus. Civ. Genova (3), VI., p. 217.
Puwakpitiya.

Sub-family **Aphodiinæ.**

Genus APHODIUS.

CRENATUS Harold (1862), Berl. Ent. Zeit., p. 141.
Ambalangoda.

AMŒNUS Boheman (1857), Ins. Caffr., II., p. 354.
Bandarawela.
var. PALLIDICORNIS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 207.
Peradeniya, Puwakpitiya, Upper Kelani.
var. VESTITUS Boheman (1857), Ins. Caffr., II., p. 359.
Ambalangoda.

MŒSTUS Fabricius (1801), Syst. El., I., p. 78.
Puwakpitiya.

CARINULATUS Motschulsky (1863), Bull. Moscou, II., p. 461.
Puwakpitiya.

Genus ATÆNIUS.

CEYLONENSIS A. Schmidt (1912), Arch. Naturg., Jahrg. 78, Abtheil. A., p. 199.
Talgaswella. A single specimen.

Genus PSAMMOBIUS.

INDICUS Harold (1877), Ann. Mus. Civ. Genova, X., p. 100.
Ceylon (no precise locality recorded). One specimen.

Genus RHYSSEMUS.

GRANULOSUS Ballion (1871), Bull.-Moscou, II., p. 154.
Peradeniya, Hantana Hills.

Sub-family **Troginæ.**

Genus TROX.

INCLUSUS Walker (1858), Ann. Mag. Nat. Hist. (3), II., p. 208.
Puwakpitiya.

Sub-family **Orphninæ.**

Genus ORPHNUS.

MYSORIENSIS Westwood (1846), Trans. Ent. Soc., London, p. 178.
Ambalangoda, Talgaswella, Peradeniya.
PICINUS Westw. (1846), Trans. Ent. Soc., London, IV., p. 176.
Ambalangoda.

Genus PHÆOCHROUS.

EMARGINATUS Castelnau (1840), Hist. Nat. Col., II., p. 109.
Ambalangoda. Several specimens under a dead PYTHON MOLURUS Gray.

Sub-family **Dynastinæ.**

Genus Heteronychus.

PUNCTOLINEATUS Fairmaire (1893), Ann. Soc. Ent. Belgique, XXXVII., p. 313.
Seenigoda. A single specimen.

Genus Alissonotum.

PICEUM Fabricius (1775), Syst. Entom., I., p 14.
Ceylon (no precise locality recorded). One specimen only.

Genus Phyllognathus.

DIONYSIUS Fab. (1792), Ent. Syst., I., 1, p. 20.
Puwakpitiya, Seenigoda. Twelve specimens.

Genus Oryctes.

RHINOCEROS Linnaeus (1758), Syst. Nat. ed., X., I., 2, p. 544.
Everywhere in low-country, the larva in vegetable mould, the adult insect, especially in the sprout of young coconut trees (very destructive).

Genus Eophileurus.

CINGALENSIS Arrow (1908), Trans. Ent. Soc., London, 1908, p. 333.
Matale. A single specimen.

Sub-family **Cetoniinæ.**

Genus Heterorrhina.

ELEGANS Fabricius (1781), Spec. Ins., I., p. 56.
Puwakpitiya, Talgaswella.
var. ANTHRACINA Westwood (1848), Cab. Or. Ent., p. 36, pl. 17, f. 7.
Puwakpitiya.

Genus CLINTERIA.

IMPERIALIS Paykull (1817), Schönh. Syn. Ins., I., 3, App., p. 58.
Colombo, Peradeniya (in rotten wood), Hantana.

CHLORONOTA Blanchard (1850), Cat. Collect. Ent. Paris, p. 38.

QUATUORDECIMMACULATA Fabricius (1792), Ent. Syst., I., 2, p. 150.

Genus MACRONOTA.

QUADRIVITTATA Schaum (1848), Trans. Ent. Soc., London, V., p. 68, pl. 2, f. 4.
Talgaswella.

Genus PROTÆTIA.

AURICHALCEA Fabricius (1775), Syst. Entom., I., p. 49.
Ambalangoda.

WHITEHOUSEI Schaum (1848), Trans. Ent. Soc., London, V., p. 72, pl. 11, f. 3.
A single specimen.

ALBOGUTTATA Vigors (1826), Zool. Journ., II., p. 238, pl. 9, f. 3.

Genus OXYCETONIA.

VERSICOLOR Fabricius (1775), Syst. Entom., I., p. 51.
Hirimbura, near Galle.
var. CRUENTA Pallas (1781), Icones Ins., p. 21, pl. B, f. A 24.
var. VARIEGALA Fabricius (1775), Syst. Entom., I., p. 51.
Puwakpitiya.

Genus ANTHRACOPHORA.

CRUCIFERA Olivier (1789), Entom., I., 6, p. 39, pl. 5, f. 29.

Genus CŒNOCHILUS.

TAPROBANICUS Westwood (1874), Thes. Ent. Oxon., p. 46, pl. XII., f. 8.
Seenigoda.
A single male was found in a subterranean nest of TERMES HORNI, Wassmann.

THE PASSERINE BIRDS OF CEYLON.

By W. E. Wait, M.A., F.Z.S.

(*With two Plates.*)

THE present paper completes the rough draft for the proposed Handbook on the Birds of Ceylon, and as soon as it appears in print, I shall be able to undertake the task of revision for publication in volume form. The *Passeres* were originally to have been described by Mr. W. A. Cave. As, however, during the whole period of the war Mr. Cave was engaged on local military duties, in addition to his own professional work, and as soon after his demobilization he left the Island, he was unable to finish the task. Before his departure he handed over to me descriptions, in practically complete form, of the first sixty species. Consequently this instalment owes much to his preparation.

It is now over six years since the scheme for the Handbook was first proposed, but the unavoidable delay caused by the war has not been without advantages. Mr. E. C. Stuart Baker, the recognized authority on the ornithology of the Oriental region, is at present bringing out in the Journal of the Bombay Natural History Society a revised list of the Birds of India on a trinomial classification. It will, therefore, be possible to take advantage of the latest classification when publishing the Ceylon Handbook.

Thirty years ago, when Oates and Blanford wrote their standard work on the Birds of British India, the binomial system, founded by Linnæus in the middle of the eighteenth century, was still universally used in all branches of Natural History. That is, each species was described scientifically by its generic and specific names. For instance, the House Sparrow was known as *Passer domesticus*. Since then, however, ornithological workers, especially field workers, have

gradually realized that this classification was hardly sufficient in the case of many widely distributed species. It was apparent, for example, that with many birds which ranged all over the Indian Empire forms from the deserts of North-West India differed noticeably and constantly, on the one hand, from the forms met with in the Himalayas, and, on the other hand, from those found in Ceylon or Southern Burma, though each geographical race passed into the next by the most gradual transitions throughout the intervening areas. Under the old binomial system all these geographical races had either to be lumped together under one specific name, or split into a variety of species with very minor distinctions. Sometimes one course was adopted, sometimes the other. In Oates' and Blanford's " Birds of British India " the geographical races of the Madras Red-vented Bulbul, which is found practically all over India and Burma, are divided into six different species. On the other hand, the common Indian Crow Pheasant, in which there are several well-marked geographical races, is treated as one species.

To meet the situation, modern ornithologists, wherever necessary, have adopted a trinomial classification, which enables them to differentiate sub-species. For the definition of a sub-species I quote Mr. Stuart Baker: " A sub-species is a geographical race or variation differing in some respect from the form first described as the species, yet linked to it by other intermediate forms found in intervening areas. It is essential, however, that to entitle such a variation to a trinomial, it should have arrived at a point in its evolution sufficiently advanced to enable it to exist as a permanent form within some definite area. From this it will be seen that a sub-species is merely a term for a species in the making."*

The principle on which the system is worked may be explained briefly as follows: Where it is necessary to divide a species, the sub-species identical with the form from which the species was originally described is expressed by repeating the specific name; the new sub-species is given an appropriate

* " Sub-species and the field Naturalist." Journal of the Bombay Natural History Society. May, 1919. Vol. XXVI., part 2, p. 518.

sub-specific name. Thus, if one wishes to describe as a new sub-species the Ceylon form of the Magpie Robin—*Copsychus saularis*—it may be shown as *C. saularis ceylonensis*. The Indian form, to which the name *C. saularis* was first applied, would become *C. saularis saularis*. Where two or more forms originally ranked as separate species are to be re-grouped as sub-species, the form which has the oldest scientific name takes precedence. Thus, the Common Indian Mynah and the Ceylon Mynah, formerly ranked as separate species—*Acridotheres tristis* and *A. melanosternus*—are now considered to be merely sub-species of the same bird. *A. tristis* was named by Linnæus in 1766, *A. melanosternus* by Legge in 1879. The Indian form, therefore, becomes *A. tristis tristis*, and the Ceylon form *A. tristis melanosternus*.

At the beginning of last year Mr. Stuart Baker kindly furnished me with a manuscript list of the Ceylon *Passeres*, showing several modifications made in the family groups since the time of Oates, and also giving the trinomials of Ceylon forms as far as he had then worked them out. In order not to delay this instalment I have followed this admittedly incomplete and tentative list, but there is no doubt that Mr. Baker's catalogue, when completed and printed, will contain a good many further modifications. As I have already noted, the Ceylon Handbook in its volume form will follow Mr. Baker's classification as eventually published.

Order **PASSERES.**

Passerine Birds.

For all the wide diversities of size, colour, and outward form, the whole range of birds is wonderfully alike in general structure, and the differences between the most divergent ornithological orders are not nearly so great as those between even nearly allied orders of mammals. The structural keymarks distinguishing the *Passeres* lie in the formation of the bones of the palate and in the two tendons which run down the leg and serve the toes. These two tendons, known

as the deep plantar tendons, vary in their disposition. They are said to be Passerine when the one tendon serves the three front toes and the other the hind toe, both tendons being wholly disconnected in such a manner that the hind toe is mobile and worked independently of the other three. All the *Passeres* are also characterized by possessing an arrangement of the bones of the palate known as " ægithognathous." The combination of Passerine deep plantar tendons with the above-mentioned form of palate will always serve to distinguish the *Passeres* from any other order. I do not propose, however, to go further into these structural characters, as it is not a difficult matter to diagnose all Ceylon forms of the order by outward marks, as follows.

They are all birds of medium or small size ; with the single exception of the crow family, they never run larger in the body than a Thrush or Mynah, and are frequently smaller. The young when hatched are in a helpless and almost naked condition, being clothed at first merely with a few isolated patches of down. The bill is never furnished at the base with a cere, or membrane of soft skin. The legs are feathered down to, but no further than, the tarsal joint. Lastly, the outward structure of the feet is typically constant. The first, or hind toe, also known as the hallux, is always present, and is movable independently of the three front toes, while the front toes are separated from each other down to their bases. Compare, for instance, a crow—a Passerine bird—with an Indian Roller, often erroneously called a Blue Jay. Both birds are of the same size and build, but in the Roller the middle front toe is united to the outer toe at the extreme base, and to the inner toe for the length of the first joint. Again, in certain other orders, such as the Cuckoos, the feet are " zygodactylic," *i.e.*, two toes only are turned to the front, while the first and fourth toes are directed backwards.

The *Passeres* are by far the largest order of birds, comprising at least half of all the living species. They are also generally acknowledged to be the most specialized and most highly organized order. In other words, at the present general stage of evolution, they are the dominant ornithological order, and, as Darwin has pointed out, dominant groups show the

greatest tendency to variation. As a consequence, though there are many exceptions, the average Passerine species are confined to smaller areas than less specialized and more widely distributed species and sub-species of other orders. This is well shown by a comparison of the list of birds found within the wide area of the Indian Empire with the list of our smaller area in Ceylon. In the Indian list the Passeres occupy a full half. In the Ceylon list, however, we find that only one-third of our birds or about 120 species are Passerine. It is not so much that Ceylon, taking into account its varieties of climate and configuration, is remarkably poor in birds of the order, but that a very large proportion of the Indian forms are confined to restricted areas, being replaced in other areas within the Empire by different, but closely allied, species and sub-species.

With such a large assemblage of forms belonging to a single order and possessing the same main structural characters, the task of classification is extraordinarily difficult, and few ornithologists agree in all particulars regarding the grouping of the various species into families, or the sequence in which the families themselves should be arranged. The order is divided primarily into two main groups, based on a difference in the structure of the syrinx, or organ of voice. In the *Acromyodi* the intrinsic muscles of the syrinx are attached to the ends of the open rings of the bronchial tubes; in the *Mesomyodi* these muscles are much simpler, and are attached to the middle of the rings. This division need not, however, greatly trouble the Ceylon student. The *Mesomyodi* are found mainly in the New World, and only one species of the group, the Indian Pitta—*Pitta brachyura*—occurs in Ceylon. It happens to possess a very distinctive plumage, and is also to be diagnosed by the formation of the wing. It has ten primary wing quills,* and the first primary is nearly as long as the second. Many Ceylon *Passeres* have ten primaries, but in every other such case the first primary is markedly small.

* The primary quills are those which spring from the pinion—*i.e*, the outer portion of the wing, beyond the "elbow," which is really the joint corresponding to the wrist.

As regards the *Acromyodi*, I propose to follow the classification given by Oates in volmes I. and II. on Birds in the Fauna of British India, making, however, one or two modifications communicated by E. C. Stuart Baker. According to this classification, twenty families belonging to the group are found in Ceylon. Some of these families may be marked off by clear, though minor, structural characters. For instance, the Larks have the hinder side of the tarsus scutellated; the Sun-birds and Flower-peckers have the edges of the bill serrated; the Swallows, Wagtail family, and the Sparrows have only nine primaries; while the Weaver-bird family and the Sparrows have conical bills, in which the nostrils are set very far back, and lie nearer to the ridge than to the cutting edge of the mandible. The remaining families, however, all possess ten primaries, the first being small, and no structural differences sufficient or constant enough to serve as sharply defined lines of division. Oates, therefore, fell back on a system of grouping according to the types of plumage normally found in the young of each family. He recognized five main groups. In the first the nestling resembles the adult female, but is paler; in the second it is more brilliant than the adult female, and is generally suffused with yellow; in the third it is transversely barred; in the fourth streaked; in the fifth it is mottled or scaly-patterned. In certain genera, however, the young are exceptions to the normal family rule. For instance, some nestling Flycatchers and Thrushes are plain and not mottled.

I give below a short synopsis of the Passerine families found in Ceylon. Where possible, in addition to the structural points, I have given short remarks on distinctive characters of form, colour, and size, which will render identification more easy for the beginner; but it must be remembered that in some cases these latter distinctions hold good only for the limited number of forms occurring in this Island. I hope that this synopsis, taken in conjunction with the short descriptions given in the text at the beginning of each family and subfamily group, will enable beginners to get a fair grasp of the different families belonging to this order, which are found within our limits.

Synopsis of Passerine Families found in Ceylon.

ACROMYODI.

A.—Wing with ten primaries, the first being small; edges of mandibles not serrated; hinder part of tarsus smooth; nostrils clear of line of forehead.

(*a*) Plumage of nestling resembles that of adult female, but paler.

(1) Nostrils completely hidden by bristles; first primary over ½ length of second; size large, length over 16 inches. — *Corvidæ* (Crow family)

(2) Nostrils completely hidden by bristles; first primary not over half length of second; size small, length 5½ inches. — *Paridæ* (Tits)

(3) Nostrils bare or overhung only by a few hairs or plumelets; inner and hind toe equal; size medium or small. — *Crateropodidæ* (Babblers, Bulbuls, and their allies)

(4) Nostrils overhung by a few hairs; climbing birds; hind toe much longer than inner; size small. — *Sittidæ* (Nut-hatches)

(5) Tail forked and with only ten feathers; plumage mainly black. — *Dicruridæ* (Drongos)

(*b*) Plumage of nestling resembles that of female, but brighter.

(1) Size smallish, seldom reaching 7½ inches. Plumage generally plain. — *Sylviidæ* (Warblers)

(*c*) Plumage of nestling cross-barred.

(1) Size variable; bill strong, hooked, and notched. — *Laniidæ* (Shrikes)

(*d*) Plumage of nestling normally streaked.

(1) Rictal bristles present; size medium; plumage bright yellow and black. — *Oriolidæ* (Orioles)

(2) Rictal bristles present ; size medium ; plumage mainly glossy black. — *Eulabetidæ* (Grackles)

(3) No rictal bristles ; size medium .. — *Sturnidæ* (Mynahs and Starlings)

(*e*) Plumage of nestling normally streaked or scaly-patterned.

(1) Nostrils covered by horizontal hairs; size variable ; legs and feet weak. — *Muscicapidæ* (Flycatchers)

(2) Nostrils not covered by horizontal hairs ; size medium ; legs and feet fairly stout. — *Turdidæ* (Thrushes)

B.—Wing with either nine or ten primaries ; edges of mandibles not serrated ; hinder part of tarsus smooth ; bill conical, the nostrils pierced within line of forehead and closer to the ridge of the bill than to the cutting edges.

(1) With ten primaries, the first small ; size small or very small. — *Ploceidæ* (Weaver Bird family)

(2) With nine primaries, the first and second nearly equal ; size small. — *Fringillidæ* (Finches and Sparrows)

C.—Wing with nine primaries, the first and second nearly equal ; edges of mandibles not serrated ; hinder part of tarsus smooth ; bill not conical.

(1) Wings long and pointed ; in the folded wing the longest secondaries fall far short of the tips of the primaries. — *Hirundinidæ* (Swallows)

(2) In the folded wing the longest secondaries reach almost to the tips of the primaries. — *Motacillidæ* (Wagtails and Pipits)

D.—Hinder part of tarsus scutellated; wing in all Ceylon forms with ten primaries, the first being small.	*Alaudidæ* (Larks)
E.—A white ring of small close-set feathers round the eye; tongue split into two, each half broken up into a bunch of brush-like fibres; size very small.	*Zosteropidæ* (White-eyes)
F.—Bill with the terminal third of both mandibles finely serrated; size very small.	
(1) Bill long, curved, and cylindrical.	*Nectariniidæ* (Sunbirds)
(2) Bill short and triangular ..	*Dicæidæ* (Flower-peckers)

MESOMYODI.

Wing with ten primaries, the first being large ..	*Pittidæ* (Pittas)

Family CORVIDÆ.

Crows, &c.

The *Corvidæ* are the first of a group of five families found in Ceylon, in which the plumage of the nestling resembles that of the adult female. Structurally they differ from the *Paridæ*—Tits—in that the first primary is considerably over half the length of the second, and, from the other three families of the group, in that the nostrils are completely hidden by feathers and bristles instead of being bare or only partially concealed. The *Corvidæ* are represented in Ceylon by three birds: the two familiar species of crow and the beautiful Ceylon Jay, or more properly Magpie, which is found only in the hills. They are our largest Passerine birds. The bill is fairly powerful; the nostrils are clear of the line of the forehead and are protected by horizontal bristles; the legs and feet are stout, the back of the tarsus is smooth, the front scutellated—*i.e.*, covered with shield-like plates—the hind toe is well developed,

but inferior in length to the middle toe. The sexes are alike, and there is only one moult, in the autumn. The plumage of the nestling is paler than that of the adult.

In the genus *Corvus* the plumage is mainly black; the bill is slightly curved at the tip, but not notched; the nostrils lie far forward, and the bristles which conceal them are long and stiff; the wings are long and pointed; the tail moderate and rounded. In the genus *Cissa* the plumage is brightly coloured; the bill has a perceptible notch at the tip; the nostrils are near the base of the bill, and the concealing bristles are rather soft and short; the wings are short and rounded, and the tail long and graduated.

Key to Ceylon Corvidæ.

1.—Plumage mainly or wholly black, genus *Corvus*.

(*a*) Wholly black.

Corvus coronoides culminatus (The Black Crow).

(*b*) Neck dark smoky-gray.

C. splendens protegatus (The Ceylon House Crow).

2.—Plumage mainly bright blue and chestnut.

Cissa ornata (The Ceylon Magpie).

Corvus coronoides culminatus.

The Black Crow.

Corvus macrorhyncus (Oates, Vol. I., p. 17); *Corone macrorhynca* (Legge, p. 346).

Description.—Entire plumage black; hind-neck and sides of neck glossless; scapulars, wing coverts, rump, and outer tail feathers glossed with purple; throat and breast glossed with dark steel blue; the bases of the body feathers light smoke gray in birds from the dry districts, darker and brownish in birds from the wet zone. Pied and albino specimens are met with occasionally, and one bird in the Colombo Museum is a pale smoky-brown, slightly darker on the back and abdomen.

Bill black; iris hazel brown; legs and feet black. Dimensions rather variable: average length about 18; wing 11·5; tail 7; tarsus 2·1; bill from gape 2·25. Males are rather larger than females.

Distribution.—Found all over the low-country, except on the strip round the coast line, where it is largely replaced by the next species. Above 2,000 feet its numbers diminish, and in most localities over about 4,000 feet it appears merely as a casual visitor, but sometimes in fair numbers. The sub-species found in Ceylon occurs over a large part of India. Allied sub-species are found in Australia, South-eastern Asia, China and Japan.

Habits.—This Crow is fairly abundant, but is not nearly so gregarious as the next species. In the villages and jungles it is seen usually in pairs, but in the inland towns it may be met with in greater numbers. It is fairly omnivorous, feeding on all sorts of garbage and carrion, and is a great egg thief. The breeding season is from June till August. The nest is a large structure of twigs placed high up in a tree, or on the crown of a coconut palm. There is a fairly substantial rough lining of coconut fibre, or of grass, fine roots, wool, &c. The eggs, three or four in number, are longish ovals, as a rule slightly pointed at one end. The ground colour is light green, at times with a blue or gray tinge, speckled with brown and more washy under-markings of brownish-gray. Average size 1·63 by 1·12.

Corvus splendens protegatus.

The Indian House-Crow.

Corvus splendens (Oates, Vol. I., p. 20); *Corone splendens* (Legge, p. 349).

Description.—Forehead, crown, and lores glossy black; chin and throat black with a slight steel-blue gloss; back, wings, and tail black glossed with purple and greenish; the nape, ear coverts, the sides and back of the neck dark smoky-gray; the breast darker, almost black; remainder of lower

parts dull black, with a slight greenish gloss ; the bases of the body feathers white. Birds from the dry districts appear to be quite as dark as those from the wet zone. Pied and albino specimens are occasionally seen. Young birds are duller and less glossy.

Bill black ; iris dark brown ; legs and feet black. Dimensions a little variable. Length about 16·5 ; wing 10·5 ; tail 6·25 ; tarsus 1·9 ; bill from gape 1·9.

Distribution.—Found all round the coast, except, perhaps, in the waste tract between Hambantota and Arugam Bay, but never far inland. Various geographical races of this Crow are found throughout India and Burma. The form occurring in Ceylon is now recognized as a distinct sub-species. Unlike its Indian relatives, the Ceylon form is never found far from the sea. In Legge's time it was rare even on the coast south of Kalutara on the west and Arugam Bay on the east ; but nowadays it is common, at any rate as far east as Hambantota. It is especially numerous in the towns and villages throughout its range, but generally avoids uninhabited stretches of coast line. Where found in any numbers, it has driven out the Black Crow. The curious distribution of the two species is well seen in the Tangalla district of the Southern Province. In the coastal bazaars, such as Tangalla and Ranna, and at Weeraketiya and other villages, about 8 miles inland, the present species occurs ; whereas in the intervening fields and chena tracts the Black Crow still holds its own.

Habits.—The House Crow is even more omnivorous and far more gregarious than the last species, while its cunning and thievish impudence are well known to all Colombo residents. The breeding season is from May to August, but mainly in May and June. The nest is similar to that of the Black Crow, but the birds generally build in scattered rookeries. The eggs, generally four in number, are oval, slightly pointed at the smaller end. The ground colour is usually brighter than in those of the last species, the markings are darker and more profuse, while the under-markings are seldom so noticeable, and are at times altogether absent. Average size 1·4 by 1·06.

Cissa ornata.

The Ceylonese Magpie.

Cissa ornata (Oates, Vol. I., p. 29 ; Legge, p. 353).

Description.—Head, neck, upper breast, and upper back rich glossy chestnut ; rest of body royal blue, shading into lighter blue on the lower back, flanks, and abdomen ; the wing coverts shade from the hue of the back into dull brown, faintly washed with blue, on the primary coverts ; wing quills chestnut on the outer, blackish-brown on the inner webs, the inner webs of the tertiaries deep blue ; thighs dusky-brown washed with royal blue ; tail deep blue, the outer edge of the outside feathers and the tips of all the feathers white with a more or less irregular patch of black between the blue portion and the white tips.

In young birds the tail is much shorter and the plumage paler.

Bill, legs, and feet coral red ; iris light brown ; eyelids red and wattled at the edges, orbital skin rather paler.

Length about 18·25 ; wing 6·5 ; tail 10·5 ; tarsus 1·7 ; bill from gape 1·6.

Distribution.—Peculiar to Ceylon. It is confined to the hills, but in the damp south-west districts it is found as low down as 1,000 feet. It probably visits the lower ranges only in the north-east monsoon.

Habits.—A shy bird which goes about in small parties and keeps to heavy jungle. It spends most of its time in the branches of tall trees, but also frequents the undergrowth in search of lizards and beetles, which together with wild fruits form its food. The cry is said to resemble the clanking of a loose connecting rod on a locomotive. It appears to breed in the higher hill ranges during the north-east monsoon. The nest is placed in the top of a tree and much resembles that of a crow, but is not so carelessly put together. The eggs are bluish-green, thickly spotted all over with light umber-brown over larger under-markings of bluish-gray. Size about 1·3 by ·98.

Family Paridæ

Genus **Parus.**

Tits.

Oates in the "Fauna of British India" treats the Tits as a sub-family of the *Corvidæ*, but by most ornithologists they are raised to the rank of a family. As in the *Corvidæ*, the nestling plumage resembles that of the adult, though paler, and the nostrils are concealed by bristles. The first primary, however, does not exceed half the length of the second.

Tits are found over the greater part of the globe; but only one representative, the gray Tit, so familiar to up-country residents, is found in Ceylon. They are all small birds, and bear a great family resemblance. The bill is short and conical, and, though somewhat curved, is not hooked at the tip. The rictal bristles are short, those concealing the nostrils short and thick. The wings are weak and rounded. The legs and feet are fairly stout. In the genus *Parus* there is no crest, and the tail is slightly rounded. In their habits all Tits are more or less alike, going about in pairs or small parties, and roaming actively about the trunks and branches of trees in search of the insects and seeds on which they feed.

Parus major mahrattarum.

The Indian Gray Tit.

Parus atriceps (Oates, Vol. I., p. 46; Legge, p. 557).

Description.—Head, neck, and chest black, save for a broad white patch on the cheeks and ear coverts; a broad band of black runs down the centre of the breast and abdomen; the nape is bordered behind by a whitish patch; the rest of the back, the scapulars, rump, and the wing coverts bluish-gray, the greater wing coverts edged with gray and broadly tipped with white; wing quills blackish-brown, the longer primaries narrowly and the tertiaries more broadly edged with white; upper tail coverts deep bluish-gray; tail black, the outer feathers white with broad black inner margins and black shafts; the sides of the breast and abdomen whitish, deepening on the flanks to the hue of the back; under tail coverts black in the centre, white at the edges.

In young birds the gray of the back is tinged with yellow and the white of the under parts with buff.

Bill black; iris brown; legs and feet lead colour. Length about 5·5; wing 2·75; tail 2·4; tarsus ·7; bill from gape ·5.

Distribution.—The Indian race of the Gray Tit is found almost throughout the Indian Empire. In Ceylon it is common above about 2,000 feet. In the low-country forests it is rare, but seems to be resident here and there, and appears at certain seasons in other localities. It is occasionally seen in Colombo gardens, where in one or two instances it has been known to breed.

Habits.—This is a very familiar species in the hills, and may be seen, in almost every up-country garden, busily engaged hopping about tree trunks and branches. In the low-country it keeps mainly to the forests. In the hills the breeding season appears to extend from March to July. In the Puttalam District I have found it building its nest in April, while in Colombo a pair were observed breeding in February. The nest is rather a loose bunch of moss, feathers, hair, or coir fibre placed in a hole of a tree, wall, or bank. There are four to six eggs. They are oval in shape; the ground colour is white or pinkish-white, with red spots generally more or less confined to a ring round the larger end.

Family Crateropodidæ.

Babblers, Bulbuls, &c.

The *Crateropodidæ*, as treated by Oatse, comprise a large group of ten-primaried *Passeres*, in which the plumage of the nestling resembles that of the adult female, and which bear the following characteristics: nostrils never entirely concealed by hairs or bristles; rictal bristles present; twelve tail feathers; inner and hind toe equal. This group he divided into six sub-families. *Crateropodinæ*—the larger gregarious Babblers; *Timeliinæ*—the smaller Babblers; *Brachypteryginæ*—the Whistling Thrushes and Shortwings; *Sibiinæ*—confined in Ceylon to two species of White-eye; *Liotrichinæ*—the Bush and Green Bulbuls; *Brachypodinæ*—the true Bulbuls.

Col. Harrington, in his recent monograph on the *Timeliides*,* considerably altered this classification, proposing the name of *Timeliides* for the group, which he raised to the rank of a sub-order. From this sub-order he excluded the *Brachypteryginæ* and *Brachypodinæ*, also the White-eyes and those genera of the Liotrichinæ, of which representatives are found in this Island.

Stuart Baker, in a still more recent classification, which I propose to follow, has not been quite so drastic in his revision. He retains the *Crateropodidæ* as a family, rejecting the *Brachypteryginæ* which he transfers bodily to the Thrushes, as far as Ceylon is concerned, with the exception of *Elaphrornis palliseri*—the Ceylon Shortwing. This last species is most probably a Warbler, but its position is still a little uncertain. The White-eyes are also raised to the rank of a family—*Zosteropidæ*, and placed next to the *Nectariniidæ*—Sunbirds.

The *Crateropodidæ* found in Ceylon, as thus reconstituted, fall into four sub-families. The characters distinguishing the whole family are those given by Oates, and narrated above with the following additions: Wing rounded, habits non-migratory. In fact, one of the main features of the family as thus defined is the absence of any migratory species. As a consequence, there is a tendency throughout the group for the forms to split up into species of restricted habitat, or into well-marked geographical races, *i.e.*, sub-species. A large proportion of the forms found in Ceylon are specifically or sub-specifically distinct from their nearest Indian allies. Further, there is no doubt that in several of our Ceylon forms, birds from the damper low-country forests tend, as a rule, to be darker than specimens from the drier forest tracts, or from the more open patana districts up-country. In several cases these paler specimens have been, by some onithologists, sub-specifically distinguished from the darker. In each case, however, the distinction is based solely on paler tones in the plumage generally unaccompanied by any well-marked differences in size, &c. It is a well-known fact that the hue of the plumage is largely influenced by the density of the rainfall

* *Vide* Journal Bombay Nat. Hist. Soc., Vol. XXIII.

Since, however, the rainfall zones in Ceylon are rather complicated I have hesitated to accept a sub-specific division based solely on paler shades of plumage. The geographical distribution of the resultant sub-species would be about as scattered as that of the county of Cromarty, while in all probability, if large series were collected from all parts of the Island, at least six out of every ten specimens would have to be classed as "intermediate," while only one or two would be recognized as belonging definitely to the darker or lighter races. In some cases, too, the variation appears to be as much individual as local, and any attempted subdivision would offend against the rule that no two sub-species of the same species can be resident in the same locality. Far more material, than is at present available, is required before any subdivision of such forms can be indisputably accepted.

The Ceylon members of the four sub-families may be divided thus :—

(1) *Crateropodinæ.*—Larger Babblers over 8 inches in length ; sexes alike ; gregarious ; partly arboreal and partly terrestrial, and extremely noisy ; legs and feet large ; wing short and rounded ; nostrils not completely hidden by plumes and feathers. All the Ceylon forms lay unspotted white or blue eggs.

(2) *Timeliinæ.*—Smaller Babblers under 7 inches in length ; sexes alike ; solitary or found only in small troops ; not noisy, and generally skulking in bushes, or on the ground among undergrowth ; legs and feet strong ; wings short and rounded ; nostrils exposed. All Ceylon forms lay spotted eggs.

(3) *Liotrichinæ.*—Bush Bulbuls and Green Bulbuls. Sexes dissimilar ; solitary or found in small troops ; brightly coloured ; entirely arboreal. The eggs in all Ceylon species are streakily marked.

(4) *Brachypodinæ.*—True Bulbuls. Sexes alike ; solitary or found in small troops ; habits arboreal ; tarsus very short ; wings rounded, but moderately long ; nape usually furnished with some long hairs. The eggs are spotted, almost invariably, with some shade of red.

Sub-family *Crateropodinæ*.
Babblers.

This sub-family contains the larger gregarious Babblers, which lay unspotted eggs. It is not well represented in Ceylon, though one species, the familiar "seven sisters," is one of our commonest birds. Out of ten genera and about seventy species found within Indian limits, only four species occur in this Island. Two of these are specifically, and two sub-specifically, distinct from the nearest Indian forms. All four species are of about the same size, that of an English Thrush. They pass a good deal of their time in trees, but pick up their food from the ground, hopping along in small troops, and making an incessant chatter as they turn over dead leaves, &c., in search of the insects on which they feed. Their legs are strong, their wings rounded and weak. In the genus *Crateropus*, to which two species undoubtedly belong, the bill is moderately long and only slightly curved. The position of a third species, *C. cinereifrons*, is doubtful. It differs from the other members of the genus in having a black, not a yellow, bill, while the covering membrane of the nostrils is bare instead of being half concealed with plumelets. Its eggs are not known with certainty, and may be white. Those of the other *Crateropi* are blue. In the genus *Pomatorhinus* the bill is as long as the head, slender, and with a pronounced curve. The under plumage is mainly white, and so are the eggs.

Key to Ceylon Crateropodinæ.

A.—Bill fairly stout, not greatly curved, no white in plumage. Genus *Crateropus*.

(1) Bill yellowish.

(*a*) Plumage ashy-brown, outer web of primaries much paler than inner.

C. striatus striatus (Southern Indian Babbler).

(*b*) Plumage rufous-brown, outer web of primaries not much paler than inner.

C. rufescens (Ceylonese Babbler).

(2) Bill black.

C. cinereifrons (Ashy-headed Babbler).

B.—Bill long, slender, and markedly curved, lower plumage largely white.

Pomatorhinus horsfieldi melanurus (Southern Scimitar Babbler).

Crateropus striatus striatus.

The Southern Indian Babbler.

Crateropus striatus (Oates, Vol. I., p. 112); *Malacocercus striatus* (Legge, p. 494).

Description.—Upper plumage, head, neck, and chest pale ashy-brown, the feathers with paler gray edges, those of the back also with paler shaft stripes; wing coverts more uniform brown; wing quills dark brown, the outer webs with much paler whitish-brown margins; upper tail coverts slightly more rufous; tail smoky-brown shading into darker brown towards the tip and with numerous cross-rays of darker brown; lower breast, abdomen, and under tail coverts dingy, tawny-brown. Birds from the dry districts are slightly paler on the head, neck, and breast, the edges of the feathers having almost a pearly tinge.

Bill pale horny yellow; iris white; eyelid yellowish; legs and feet dingy yellowish-white.

Length 9·5; wing 4·1; tail 4; tarsus 1·3; bill from gape 1·0.

Distribution.—The sub-species found in Ceylon is confined to this Island. It is distinguished from the South Indian form, *C. striatus griseus*, by its smaller size and smaller bill. It is found all over the low-country, being most abundant in chena, scrub jungle, and cultivated tracts. In the hills it is abundant and more locally distributed, but appears to be increasing. It is rare, however, over 5,000 feet.

Habits.—One of our most familiar birds, generally known as the "Seven Sisters" from its custom of going about in little troops of from five to seven individuals. It is seldom met with far from cultivation. The general habits are described in my remarks on the sub-family.

The eggs may be found almost all the year round, but it breeds chiefly during the north-east monsoon. The nest is a fairly compact cup made of coarse grass and plant stalks and lined with finer grass. It is usually placed in the fork of a shrub from 4 to 6 feet from the ground, but I have found it in the branches of trees as high as 20 feet up. There are usually three, rarely four eggs. The usual shape is a dumpy oval, slightly pointed at the smaller end. The texture is smooth and glossy, the colour greenish-blue. Average size ·95 by ·72.

Crateropus rufescens.

The Ceylonese Babbler.

Crateropus rufescens (Oates, Vol. I., p. 114); *Malacocercus rufescens* (Legge, p. 497).

Description.—Upper plumage, wings, and tail rufous-brown, the head slightly grayer, the outer margins of the feathers slightly paler and tinged with olive ; the tail indistinctly cross-rayed ; the lower plumage ferruginous-brown, the colour deepening a little on the flanks, vent, and under tail coverts. A specimen from Pundaluoya in the hills of the Central Province is distinctly grayer on the head, and more dusky elsewhere than in those from Sabaragamuwa and the Western Province.

Bill orange yellow ; iris white, at times tinged with green or yellow ; eyelid and orbital skin greenish-yellow ; legs and feet dull chrome yellow .

Dimensions a little variable : length about 10 ; wing 4·1 ; tail 4·5 ; tarsus 1·3 ; bill from gape 1.

Distribution.—Peculiar to Ceylon, and restricted to the interior of the Island in the districts with a heavy rainfall, *i.e.*, the west and south-west sides of the main hill ranges, and the country at the foot of these hills. Within these limits it is found at all elevations.

Habits.—Unlike the last species this is a jungle bird, found in thickets, bamboo scrub, and deep forest. It goes about in fairly large troops of about a dozen, and behaves in much the

same manner as the more familiar "Seven Sisters." The breeding season appears to last from March to May. The nest resembles that of the preceeding species. It is placed among creepers surrounding tree trunks, or in a low fork, and is very carefully concealed. According to Legge, the eggs are pointed ovals in shape, deep greenish-blue in colour, and measure about ·95 by ·75.

Crateropus cinereifrons.

The Ashy-headed Babbler.

Crateropus cinereifrons (Oates, Vol. I., p. 114); *Garrulax cinereifrons* (Legge, p. 499).

Description.—Forehead, crown, and sides of head ashy-gray with a bluish tinge in some lights, shading on the nape into the deep rufous-brown of the upper plumage, wings, and tail; the outer webs of the first few primaries are slightly paler, and the tail rather deeper in colour; chin whitish, shading into the tawny rufous-brown of the rest of the lower parts; flanks and under tail coverts rather darker.

Bill black; iris white; eyelids lead colour; legs and feet plumbeous-brown.

Length 10; wing 4·5; tail 4·25; tarsus 1·5; bill from gape 1·2.

This bird is not a true *Crateropus*, and its generic status is uncertain. In general its plumage resembles that of a *Garrulax*, but the feathers of the forehead are short and rounded, as in *Crateropus*. The eggs are not known with certainty, and their authentication may clear up the situation.

Distribution.—Confined to the heavy jungles in the districts west and south-west of the Adam's Peak range, which it ascends to a height of about 3,500 feet. It does not occur outside Ceylon.

Habits.—Found in small troops in the heart of the jungle. It is said to breed about April, but nothing is definitely known regarding its nidification. Legge was informed by natives that the eggs were blue, but they may possibly be white. Further information on this point is badly required.

Pomatorhinus horsfieldi melanurus.

The Ceylon Scimitar Babbler.

Pomatorhinus melanurus (Oates, Vol. I., p. 118 ; Legge, p. 501).

Description.—A band from the nostrils through the eye to the ear coverts black, bordered above by a broad white streak over the eye to the nape ; crown and nape dark olivaceous-brown ; upper plumage, the sides of the neck and body, the thighs, vent, and under tail coverts rufous-brown to olive-brown, the tint varying in individual specimens ; tail ferruginous near the base, darkening to almost black at the tip ; lower parts from chin to abdomen white. In many birds the sides of the head and chest are streaked with white ; in others the line of demarcation between the white lower plumage and the back is more abrupt.

Bill gamboge yellow, blackish adjoining the nostrils ; iris reddish-brown to dull red ; eyelid and orbital skin blue ; legs greenish lead colour, feet with a blue tinge. In young birds the bill is less curved than in adults.

Length 8·5 ; wing 3·5 ; tail 3·5 ; tarsus 1·2 ; bill from gape 1·2.

Distribution.—The Southern Scimitar Babbler is found over a large portion of Peninsular India, and is divided into four sub-species, of which the present form is found only in Ceylon. Col. Harrington is of opinion that our Ceylon form should also be divided into two races, as birds from the dry zone and the hills are, as a rule, more olivaceous than those from the low-country zone. However, as Legge points out, the variation is to a certain extent individual, and until a large series from all localities is available for examination, I hesitate to make any sub-specific distinction. This Babbler is found all over the hills and in most of the well-wooded portions of the low-country. It is rare, however, in the drier forest districts.

Habits.—A shy woodland species, which keeps close to cover, and ventures near habitations only when the thickets admit. In the hills it is especially fond of the strips of jungle bordering streams. It occurs usually in pairs, but sometimes in small troops. Its presence is most frequently made known by its deep melodious call, which Legge represents by the syllables " wok-wok-ek-ek-wok," answered by a shorter call from the female. In the hills the breeding season appears to be from December to February. In the Puttalam District I have taken the eggs in March. The nest is rather a loose, more or less domed structure of leaves, grass, &c., placed in a bank or against the foot of a bush. Three to five white eggs are laid. The shell is thin and smooth, but not very glossy. Average size ·95 by ·70.

Sub-family *Timeliinæ.*

The Smaller Babblers.

The *Timeliinæ* are a large group of small Babblers, over fifty species being found within Indian limits. They are solitary or less gregarious than the larger Babblers, and are not noisy. They are skulking in their habits, frequenting bushy places, or the undergrowth in forests, keeping largely to the ground and avoiding observation. The eggs of all Ceylon species are spotted. The wings are short and rounded, the legs and feet strong. The sub-family is not well represented with us, only four species out of as many genera occurring in the Island. Of these, one is specifically and two sub-specifically distinct from any forms found in India. In the genus *Dumetia* the feathers of the forehead and crown have rigid shafts, the tail is comparatively long and graduated, and the bill fairly slender. In *Pyctorhis* the bill is deep and not notched, the nostrils are oval and exposed. In *Scotocichla* the bill is slender, the nostrils linear; the tail is graduated and almost as long as the wing; the tarsus and toes are long and stout. In *Rhopocichla* the nostrils are rounded and well exposed, the tail short, and only slightly graduated.

Key to Ceylon Timeliinæ.

A.—Forehead and crown not conspicuously darker than the rest of the upper plumage.

(1) Length about 5·6; tail about same length as wing; bill pinkish horn colour.

Dumetia albigularis albigularis (Small White-throated Babbler).

(2) Length about 6·5; tail longer than wing; bill black.

Pyctorhis sinensis nasalis (Ceylon Yellow-eyed Babbler).

B.—A conspicuous deep chocolate cap. Length about 6·5; lower parts rusty-brown.

Scotocichla fusicapilla (Brown-capped Babbler).

C.—Forehead and cheeks black. Length about 5·5; lower parts whitish.

Rhopocichla atriceps nigrifrons (Black-fronted Babbler).

Dumetia albigularis albigularis.

The Small White-throated Babbler.

Dumetia albigularis (Oates, Vol. I., p. 134); *Dumetia albogularis* (Legge, p. 505).

Description.—Lores and feathers round the eye whitish; upper plumage, wings, and tail olive-brown; forehead and front of crown rufous with stiff shining shafts; hind-neck slightly paler than the back; tail faintly cross-rayed; the chin, throat, and centre of breast white; remainder of lower parts rust coloured, brighter in the breeding season.

Bill pinkish horn colour; iris white or greenish; legs and feet reddish flesh-coloured.

Length 5·6; wing 2·2; tail 2·25; tarsus ·75; bill from gape ·6.

Distribution.—Occurs over the greater part of the low-country and on the patanas of the hill country up to about 5,500 or 6,000 feet. The same sub-species occurs in Southern India, and another sub-species round Mt. Abu.

Habits.—Frequents bushy patanas, the long grass, and undergrowth at the edges of paddy fields, roads, and jungle paths, also waste land and low scrub. It roams about in little troops and keeps to cover as much as possible. The breeding season extends from November to June. The nest is a ball of grass with the opening at one side. It is placed within a few inches of the ground in rough grass or a low bush. The three or four eggs are dumpy ovals of china white, thickly speckled and spotted with dull red; the markings are sometimes confluent at the larger end. Average size ·71 by ·54.

Pyctorhis sinensis nasalis.

The Ceylon Yellow-eyed Babbler.

Pyctorhis nasalis (Oates, Vol. I., p. 138; Legge, p. 512).

Description.—Upper plumage rufescent earth-brown, slightly darker on the head; the tertiaries and the outer webs of the other wing quills slightly more rufous; tail feathers grayish-brown, with slightly paler edges; lores, eyebrows, and the whole of the lower plumage white, tinged on the flanks and from the breast downwards with buff.

Bill and nostrils black; iris golden yellow, eyelid chrome yellow; legs and feet dull yellow.

Length about 6·5; wing 2·6; tail 3·25; tarsus 1; bill from gape ·65. The dimensions are a little variable.

Distribution.—This sub-species is found only in Ceylon, but an allied form is found almost throughout the Indian Empire and extends into Siam. It is locally but fairly widely distributed up to about 6,000 feet, but its chief haunts are the south-east of the Island, from the Uva patanas to the sea.

Habits.—May be looked for in fern lands, stretches of mana grass, low jungle, lantana scrub, and thick undergrowth. It keeps to cover during the day, but in the evenings is fond of perching at the top of a bush, giving out its call, which Legge describes as a plaintive whistle of two notes varied with a peculiar mewing call. The breeding season extends from February to May. The nest is a deep cup of grass and cobwebs, lined inside with fine grass and roots, and placed in the fork of a shrub or in a tuft of mana grass. The three or four eggs are of fleshy-white, spotted, mainly at the larger end, with brownish-sienna, occasionally overlaid with brick red. Average size ·78 by ·58.

Scotocichla fuscicapilla.

The Brown-capped Babbler.

Pellorneum fuscicapillum (Oates, Vol. I., p. 143; Legge, p. 510).

Description.—Forehead, crown, and nape deep chocolate, with brighter shafts; rest of upper parts, wings, and tail dark olive-brown, the feathers of the upper back and wing coverts with paler shafts, the edges of the primary quills lighter rufous; the lores, sides of head and neck, and all the lower parts rusty rufous, the colour being deeper on the cheeks and ear coverts and paler on the chin and abdomen; in some specimens the sides of the neck and breast are faintly streaked.

Bill, upper mandible deep brown with pale margins, lower mandible flesh-coloured; iris light to dark red; legs and feet brownish flesh colour.

Length 6·5; wing 2·6; tail 2·5; tarsus 1·1; bill from gape ·8.

Distribution.—Peculiar to Ceylon. Fairly common in jungle undergrowth all over the wooded portions of the low-country and up to about 5,500 feet. Birds from the drier districts are paler than those from the wet zone. A pale specimen from Trincomalee has lately been distinguished as *S. f. dubaulti*, but until more material is available, I am not in favour of any sub-specific distinction.

Habits.—A shy skulking bird, keeping almost entirely to thick scrub, low jungle, or the undergrowth in forests. It is more often heard than seen. The note is a whistle, which may be described by the words "to meet you." It may frequently be heard, in the jungle, as also may the breeding song of the cock, which reminds one of a small boy whistling up and down the scale. The birds generally go about in pairs, or small family groups, picking up beetles, &c., from the ground.

The breeding season appears to be from November to March and again about September. The description of the nest given by Legge, as a cup-shaped structure placed in a bush, is probably due to an error. Authentic nests have recently been found by myself and Mr. Tunnard of Rothschild, Pussellawa. My nest, from the North-Central Province, was domed, and very cleverly camouflaged in a litter of dry leaves on the ground in the forest. The opening was at one side, and the materials were very roughly put together. The lining consisted of a few broken up dead leaves, and the roof of a few more broad dry leaves. Mr. Tunnard's nest was equally cleverly hidden, but more carefully lined with weed stalks and the stems of maiden-hair fern. The two or three eggs are broad ovals with rather a blunt narrow end. The ground colour is china white, thickly covered with grayish-purple and reddish-brown markings. Average size ·85 by ·64.

Rhopocichla atriceps nigrifrons.

The Black-fronted Babbler.

Rhopocichla nigrifrons (Oates, Vol. I., p. 160); *Alcippe nigrifrons* (Legge, p. 507).

Description.—Forehead, round the eye, and ear coverts dull black, the forehead feathers with glistening shafts; sides of neck, upper plumage, wings, and tail rufous-brown, darkening on the crown into the black of the forehead; outer wing quills with paler edges; tail darker at the tip, and in some specimens faintly cross-rayed; throat, neck, breast, and abdomen white, the feathers, except on the chin, throat,

and lower cheeks, with black bases which give the plumage a sullied appearance ; flank, vent, and under tail coverts rufous-olive.

Birds vary a good deal in the tint of the upper plumage, specimens from the low wet zone being, as a rule, decidedly more rufous, those from the hills more olive-brown, while birds from the northern forests are intermediate.

Bill dark brown on the tip, the margins of the upper mandible and the lower mandible flesh colour ; iris whitish or pale yellow ; legs and feet fleshy lavender.

Length 5·1 ; wing 2·2 ; tail 1·8 ; tarsus ·85 ; bill from gape ·7.

Distribution.—The present sub-species is confined to Ceylon, but is widely distributed over the whole Island. Allied sub-species occur on the Nilgiris and in Travancore.

Habits.—Common everywhere in thickets and forest undergrowth, especially bamboo scrub. It is an active little bird, which flits about in small parties uttering a shrill little rattling note. It appears to breed intermittently from December to June. The nest, which is frequently met with in the jungle, looks almost like a chance wisp of dry grass or bunch of dead leaves stuck in the fork of a sapling or bush about 4 to 7 feet from the ground. The inside is pocket-shaped and tilted, so that the opening lies, in some cases, almost horizontally. The two or occasionally three eggs are smooth paper-white ovals scattered over with spots of brownish-red and a few specks of bluish-gray. Average size ·75 by ·55.

Sub-family *Liotrichinæ.*

Bush and Green Bulbuls.

With this sub-family, which includes three species found in Ceylon, we come to a group of birds distinguished from the rest of the *Crateropodidæ* by the difference in plumage between the two sexes. Unlike the Babblers, they are strictly arboreal in their habits, frequenting leafy trees and living on fruit and insects. In all three Ceylon species the bill is slender,

slightly curved, and notched at the tip ; the rictal bristles are minute, the nostrils oval, the wing rounded, the tail short and square. In the genus *Ægithina* there are two moults in the year, and the males have a distinct breeding plumage ; the bill is about two-thirds the length of the head, and the plumage of the rump is very soft and fluffy. In *Chloropsis* there is no distinct breeding plumage, and only one moult a year. The bill is longer and slightly more curved, the wings are rather longer, and the tarsus very short. The eggs of all our Ceylon species are streakily marked.

Key to Ceylon Liotrichinæ.

A.—Bill about same length as tarsus ; lower plumage yellow ; wings mainly black and white.
Ægithina tiphia zeylonica (Common Iora).

B.—Bill considerably longer than tarsus ; plumage mainly grass-green ; a blue moustache stripe.

(1) Forehead orange.
Chloropsis malabarica malabarica (Malabar Chloropsis).

(2) Forehead greenish.
C. jerdoni (Jerdon's Chloropsis).

ÆGITHINA TIPHIA ZEYLONICA.

The Common Iora.

Ægithina tiphia (Oates, Vol. I., p. 230) ; *Iora typhia* (Legge, p. 490).

Description.—Male in summer plumage : Forehead, crown lores, nape, and mantle satin black ; the remainder of the back and the rump black, more or less mixed with dark green ; a tuft of concealed downy white plumes on the scapulars ; upper tail coverts and tail black ; wing coverts black with a broad white patch formed by the terminal half of the median coverts, the greater coverts more or less tipped with white ; wing quills black, the primaries brownish at the tip, and some of the quills with faint pale edges ; face, sides of neck, and all the lower parts rich yellow, which grows paler on the vent and under tail coverts. In the off season the upper plumage

becomes largely green, the black persisting most on the head and nape ; the wings and tail remain black, but the white tips on the coverts are more pronounced ; the lower parts are less rich in hue.

Female : Upper plumage dull grass-green ; forehead and upper tail coverts tinged with yellow ; scapulars darker, and tail dusky-green ; lesser wing coverts dusky-green, median coverts blackish with broad white tips faintly edged with yellow ; in the greater coverts the white is confined to the outer webs and more conspicuously tinged with yellow ; primaries blackish with faint white edges on the outer webs and broader white inner margins on the basal portions ; nner quills with broad white margins which are tinged with yellow, especially on the outer webs ; lores, sides of head, and all the lower parts yellow, shading into green on the flanks.

Bill, upper mandible black with blue margins, lower mandible blue ; iris, in males gray, mottled with brown, in females olive-gray ; legs and feet slate blue.

Length 5·4 ; wing 2·5 ; tail 1·9 ; tarsus ·75 ; bill from gape ·7.

Distribution.—The present sub-species occurs in Ceylon, Southern India, and the Malay Peninsula ; typical *Æ. tiphia* occurs over the rest of India, except in the north-west. This Bulbul is common, and widely distributed over the whole of the low-country and up to about 2,500 feet.

Habits.—A familiar little bird which keeps to leafy trees, either in gardens and open scattered groves, or on the edge of the jungle, by roadsides, &c. It is generally seen in pairs, actively flitting about among the leaves searching for insects. The male has a clear gentle whistle of two notes " wheee-too." The breeding season lasts intermittently from November to June. The nest is a beautiful little cup of fine grass and fibres, thickly coated with cobwebs and glued on to the top of a bough, or attached to a fork from 6 to 20 feet from the ground. I have never found more than two eggs. They are slightly pointed ovals of grayish-white, with rather large longitudinal streaks of bluish-gray and light brown. Average size ·70 by ·53.

Chloropsis malabarica malabarica.

The Malabar Chloropsis.

Chloropsis malabarica (Oates, Vol. I., p. 235); *Phyllornis malabaricus* (Legge, p. 488).

Description.—Male: Forehead orange-yellow; lores, cheeks, chin, and throat black; a moustache streak of hyacinth blue; lesser wing coverts turquoise blue; remainder of plumage grass-green, the inner webs of the wing quills dull brown.

In the female the throat patch and cheek stripe are smaller. Young birds are green all over.

Bill blackish; iris brown; legs and feet slaty-blue.

Length 7·5; wing 3·5; tail 2·6; tarsus ·7; bill from gape ·95. Females are slightly smaller.

Distribution.—Not so common as Jerdon's Bulbul, but widely, though locally, distributed both in the hills and the low-country. It is indistinguishable in the open from the next species, unless one is near enough to make out the orange-yellow forehead. The present sub-species is found in India on the Malabar Coast and as far north as Khandala; another sub-species is found in Assam, Eastern Bengal, Burma, and Cambodia.

Habits.—Much the same as those of the next species, but it is apparently not such a good mimic. Little is known of its breeding habits.

Chloropsis jerdoni.

Jerdon's Chloropsis.

Chloropsis jerdoni (Oates, Vol. I., p. 238); *Phyllornis jerdoni* (Legge, p. 485).

Description.—Lores, cheeks, chin, and throat black; a hyacinth blue moustache stripe; forehead, above the eye, and all round the black gorget greenish-yellow; lesser wing coverts turquoise blue; rest of plumage grass-green, the lower parts slightly brighter.

In females the lores and gorget are bluish-green and the cheek stripe greenish-blue. The young are green all over.

Bill blackish; iris brown; legs and feet pale bluish.

Length 7·4; wing 3·4; tail 2·8; tarsus ·75; bill from gape ·95.

Distribution.—Found all over the low-country in well-wooded parts. It ascends the hills to 3,500 feet or occasionally higher. It occurs over the greater portion of the peninsula of India.

Habits.—A common bird, which often escapes notice as the plumage so closely resembles the green of the foliage. It frequents trees in compounds and gardens, by the roadside and river banks, or round tanks and paddy fields. It is generally found singly or in pairs, but when not breeding, the females collect in little troops. It is an active little bird, assiduously hunting among the leaves of trees or fronds of palms for the insects on which it feeds. The male has a clear pleasant whistle, and mimics the calls of other birds with astonishing accuracy.

It appears to have several broods, beginning in November or December, as soon as the rains have set in, while I have found the eggs as late as May. The nest is hard to find. It is a soft neatly woven cup, composed of fine strips of grass or tow-like fibre, suspended by the rim to the fork of a slender twig, and always well concealed by overhanging leaves. It is generally 6 to 10 feet from the ground, but occasionally much higher. The two eggs are slightly pointed, glossless cream-coloured ovals, sparingly marked with short fine streaks or spots of dark brown, at times almost black. Average size ·82 by ·59.

Sub-family *Brachypodinæ*.

Bulbuls.

The Bulbuls are a familiar group of small birds, with fairly well-defined characteristics. They are mainly arboreal in their habits. The sexes are alike, the young closely resemble the adults, and all species lay eggs, which are marked with various shades of red and purple. The most characteristic feature of this sub-family is the extreme shortness of the tarsus, but they are further distinguished by the presence of hairs among the feathers of the nape.

In most of our Ceylon species, however, these hairs are short and sometimes difficult to detect. The rictal bristles are fairly well developed ; the nostrils lie in a groove at the base of the bill ; the wings are rounded and moderate in length ; the tail is also moderate and generally rounded. The Bulbuls are found mainly in Africa and Southern Asia. Six species belonging to five genera occur in Ceylon. One genus, *Kelaartia*, is peculiar to the Island, as is also one species of another genus. The main generic characters are given in the following key :—

Key to Ceylon Brachypodinæ.

I.—A distinct bushy, black crest.

A.—Length about 9·75 ; wing rather pointed ; outer tail feathers curved outwards ; bill coral red.
Hypsipetes psaroides ganeesa (Southern Indian Black Bulbul).

B.—Length about 7·75 ; wing blunt ; bill black ; under tail coverts crimson.
Molpastes hæmorrhous hæmorrhous (Madras Red-vented Bulbul).

II.—No distinct crest.

A.—Bill about three-quarter length of head ; upper mandible sharply keeled. Genus *Iole*.

(1) Crown and upper plumage yellowish-green.
Iole icterica (Yellow-browed Bulbul).

B.—Bill about half length of head ; upper mandible not so sharply ridged. Genus *Pycnonotus*.

(1) Crown and nape black ; upper plumage olive-green.
P. melanicterus (Black-capped Bulbul).

(2) Crown and upper plumage ashy-brown.
P. luteolus (White-browed Bulbul).

III.—Crown feathers large and rounded ; a bright yellow streak of longish pointed feathers over ear coverts.
Kelaartia pencillata (Yellow-eared Bulbul).

Hypsipetes psaroides ganeesa.

Southern Indian Black Bulbul.

Hypsipetes ganeesa (Oates, Vol. I., p. 262 ; Legge, p. 469).

Description.—Lores, forehead, crown, and nape glossy-black, with a greenish lustre in freshly moulted specimens, the feathers longish ; hind-neck, back, rump, and upper tail coverts dull bluish-gray with darker shaft streaks ; wings and tail dull brown, the wing coverts and inner wing quills edged with the blue-gray of the back ; cheeks, throat, chest, and under parts slaty-gray, paler on the abdomen, and darker on the cheeks and chin, which are tinged with ashy-brown.

Bill coral red ; iris orange or reddish ; legs and feet yellowish-red.

Length 9·75 ; wing 4·7 ; tail 4·7 ; tarsus ·8 ; bill from gape 1·2.

Distribution.—Common in the well-wooded parts of the low-country damp zone and on the hills, but rarely met with in the drier forest tracts. It appears to visit the highest elevations in the dry weather.

The sub-species found in Ceylon is also met with on the Malabar hills. Allied sub-species occur on the Himalayas, in Assam, and parts of Burma.

Habits.—Out of the breeding season this Bulbul is generally found in noisy flocks, feeding on fruits and berries at the top of tall trees in forest and jungle. Its most frequent calls are described by Legge as resembling the sounds " tchee " and " zu, kink up."

The breeding season is from January to about April. The nest is a rather untidy cup of dead leaves, roots, and moss placed in a fork of a branch generally at some height from the ground. There are usually only two eggs of a whitish ground colour thickly speckled with red and purplish-gray. Average size 1·03 by ·72.

Molpastes hæmorrhous hæmorrhous.

The Madras Red-vented Bulbul.

Molpastes hæmorrhous (Oates, Vol. I., p. 268); *Pycnonotus hæmorrhous* (Legge, p. 482).

Description.—Head, chin, and throat deep black, inclining to brown on the ear coverts; there are generally one or two longish hairs on the nape; feathers of neck, back, wing coverts, scapulars, and breast brown with pale edges; rump plain brown; upper tail coverts white; wing quills brown with narrow paler edges; tail brown at the base, deepening to black at the end and tipped with white; flanks light brown; abdomen whitish; under tail coverts crimson. In some specimens the tail coverts and tip of the tail are pale cinnamon. Birds from the hills are paler than low-country specimens.

Bill black; iris deep brown; legs and feet dark brown.

Length 7·8; wing 3·75; tail 3·2; tarsus ·85; bill from gape ·8.

Distribution.—Extremely common over the whole of the low-country and at medium elevations. It is only occasionally met with in the higher hills. This species is found in one form or another over most of India and Burma and extends to China.

Habits.—Familiar in gardens and near civilization over the whole of its usual range. It frequents bushes, low trees, hedges, &c. It is not nearly so common far from cultivation. The cry is a cheerful little chirruping warble. It breeds fairly steadily from November till May, or even later if the weather be favourable, rearing several broods. The nest is a small, rather coarsely woven cup of grass, lined almost invariably with fine red root fibres. On occasions the nest is made of fine small-leaved tender shoots. It is generally placed in a bush or hedge, but the birds occasionally build in verandahs, &c. There are usually three eggs; they are in most cases rather dumpy and slightly pointed at the small end. The ground colour varies from china-white to pinkish, thickly spread with blotchy specks of reddish-brown and purplish-gray. Average size ·85 by ·63.

Iole icterica.

The Yellow-browed Bulbul.

Iole icterica (Oates, Vol. I., p. 283); *Criniger ictericus* (Legge, p. 472).

Description.—Upper surface yellowish-green; inner webs of wing quills brown, the basal portions edged with yellow; tail feathers brighter towards the outer edges, the inner edges of all but the central feathers and the under surface of the shafts yellow; lores, base of nostrils, a narrow eyebrow, face, entire under surface, and wing lining bright yellow.

Bill black; iris red or light red; legs and feet bluish-lead or dusky-slate colour.

Length about 8; wing 3·5; tail 3·2; tarsus ·72; bill from gape ·82. Females are slightly smaller.

Distribution.—Restricted to forest and high jungle throughout the low-country and up to about 4,000 feet or even higher. In India it is found on the west coast as far north as Mahableshwar.

Habits.—Essentially a jungle bird. In the low-country it keeps to the large forests; at medium elevations it occurs in nearly every patch of jungle. It generally wanders about in little parties, which hunt actively among the boughs and in the top of the undergrowth for the insects on which they chiefly feed. The call is a soft mellow whistle. The breeding season is probably during the first half of the year, but eggs may be found as late as August. The nest is generally suspended by the rim to a fork in the top of a thin sapling. It is composed of small twigs and grass and is lined with fine grass. The two eggs are longish ovals; the ground colour is dull white or pinkish, thickly speckled with pale brownish-red or pink markings. Average size (of Indian eggs) ·96 by ·67.

Pycnonotus melanicterus.

The Black-capped Bulbul.

Pycnonotus melanicterus. (Oates, Vol. I., 288); *Rubigula melanictera* (Legge, p. 477).

Description.—Forehead, crown, nape, and sides of head black; upper plumage and wing coverts olive-green; wing quills brown, the outer webs olive-green; tail feathers dark

brown, the basal portions washed with the hue of the back; there is a broad white patch on the tips of the outer feathers; this patch decreases on the inner feathers, the central pair being unmarked; lower plumage bright yellow, the sides of the breast and body washed with olive; wing lining and edge of wing yellow.

Bill black; iris dull red in males, dark brown in females; legs and feet blackish in males, blackish-blue or deep lead colour in females.

Length 6·5; wing 2·8; tail 2·6; tarsus ·6; bill from gape ·78. Females are slightly smaller.

Distribution.—Peculiar to Ceylon. It occurs throughout the whole of the low-country, except in the most arid parts, and on the hills up to about 5,000 feet.

Habits.—Fairly common in forest, low jungle, clumps of thicket, shady ravines, &c. It may be met with either in pairs or small troops, and often consorts with the forest Bulbul or White-browed Bulbul. The note is a little "whee whee, whee, whee." The breeding season is probably from March to July, occasionally later. The nest, of the usual Bulbul type, is placed in the fork of a low tree or bush, or even on a dead stump. Two or three eggs are laid. The ground colour is reddish-white, thickly marked with reddish-brown and a little bluish-gray. Average size ·79 by ·58.

Pycnonotus luteolus.

The White-browed Bulbul.

Pycnonotus luteolus (Oates, Vol. I., p. 290; Legge, p. 475).

Description.—Upper plumage ashy-brown, the edges of the feathers, except on the crown, washed faintly with green; rump and upper tail coverts slightly paler; wings and tail brown, washed with greenish on the outer webs; a broad streak from the nostril over the eye and an indistinct ring round the eye whitish; lores streaky white and black; ear coverts brownish; the point of the chin and a stripe along the lower jaw yellowish; under parts dingy-white, washed with

brown on the chest and flecked with pale dingy-yellow ; vent and under tail coverts, wing-lining, and edge of wing pale yellow.

Bill black ; iris rusty-red to blood-red ; legs and feet dusky lead-colour.

Length 7.4; wing 3·2; tail 3·1; tarsus ·87 ; bill from gape ·85.

Distribution.—Very common all over the low-country and in the hills to 3,000 feet or even higher. In India it is found over a great part of the peninsula proper.

Habits.—Very much the same as those of the Madras Bulbul but it is not nearly so partial to cultivation, being especially common in bushy scrub, lantana, chenas, low jungle, and the undergrowth in dry forests.

It feeds partly on insects, but is very fond of small berries, such as those of the lantana. It is rather a shy bird, evading observation as much as possible.

It breeds freely from February to June. The nest is scarcely distinguishable from that of the Madras Bulbul, and like it, is generally placed in a low bush. There are, however, seldom more than two eggs. Typically they are longer and narrower than those of the Madras Bulbul, but light specimens are often very hard to distinguish. In more heavily marked eggs the markings are less claret-coloured and more of a light reddish-brown, while the tint of the ground colour, though pale, differs correspondingly. Average size ·91 by ·62.

Kelaartia pencillata.

The Yellow-eared Bulbul.

Kelaartia pencillata (Oates, Vol. I., p. 297 ; Legge, p. 480).

Description.—A narrow white line from the nostril to the upper part of the eye ; forehead and crown dull black, the feathers broad and loose, giving a scaly effect ; a broad yellow streak from the top of the eye to the nape ; a spot on the upper eyelid and the chin white ; lores and cheeks black ; ear coverts black with a yellow spot, behind which the colour changes into a gray patch ; upper plumage olive-green ; wings and tail dark brown washed with olive-green on the

outer webs; lower plumage from throat to tail coverts yellow, washed with olive on the breast and flanks; wing-lining and edge of wing yellow.

Bill black; iris red mingled with brown or deepening to brown next the pupil; legs and feet dark lead-blue.

Length 7·75; wing 3·25; tail 3·2; tarsus ·78; bill from gape ·85. Females are rather smaller.

Distribution.—Confined to Ceylon and restricted to the hills, being seldom found much below 3,500 feet.

Habits.—Abundant in the higher ranges where it frequents forests, patana, woods, and the outskirts of cultivation. It keeps generally to the lower trees and undergrowth, and appears to live mainly on fruit. The call is a small plaintive whistle "whee, whee, whee," quickly repeated. The breeding season appears to be about April. The nest is a fairly neat cup of moss, grass, and fine roots and leaves. There appear to be only two eggs of a pale pinkish ground colour, with rather blurred blotches and streaks of pinkish-brown. I have no measurements, but probably the eggs are of the same size as that of the forest Bulbul.

Family Sittidæ.

Genus **Sitta**.

Nuthatches.

The Nuthatches are a family of small climbing birds found in temperate and warm climates all over the world, with the exception of South America and Africa, south of the Sahara. The foot is adapted for climbing, the hind toe and claw being greatly developed and the inner front toe shortened. The hind surface of the tarsus is smooth. The bill is about as long as the head, straight, and wide at the base. The nostrils are clear of the line of the forehead, and are overhung by hairs. The rictal bristles are well developed. The wing, which has ten primaries, is rather pointed; the first primary is less than half the length of the second. The tail of twelve feathers is short and practically square.

The plumage of the two sexes is generally different, and there is only one moult a year.

Nuthatches are of non-migratory habits. They feed both on nuts and insects, and nest in holes of trees or of rocks. Only one species is found in Ceylon.

Sitta frontalis frontalis.

The Velvet-fronted Blue Nuthatch.

Sitta frontalis (Oates, Vol. I., p. 307); *Dendrophila frontalis* (Legge, p. 560).

Description.—Male: Lores, a broad band across the forehead and a long streak over the eye to the nape deep velvet black; upper plumage and wing coverts deep lavender-blue; wing quills dull black, the first two primaries unmarked, the outer webs of the remaining primaries edged with light blue, the secondaries edged with the blue of the back, the tertiaries almost entirely blue; the middle feathers of the tail blue, the remainder dull black, edged and tipped with blue; ear coverts lilac; chin and throat whitish; the rest of the lower parts brownish-lilac.

Females have no black eyebrow streak, and the lores are generally washed with blue.

Bill coral red, the tip of the upper mandible blackish; iris yellow; eyelids lead colour; legs and feet brownish.

Length 5; wing 3; tail 1·8; tarsus ·7; bill from gape ·7.

Distribution.—Found throughout the hills and in the tall forests of the low-country. It occurs in one form or another throughout the greater part of India, and extends through Burma to Java.

Habits.—A dainty little bird, which attracts notice by its velvety blue plumage and vivid red bill. It is generally found in small troops, actively running up and down or round and round tree trunks and large boughs. It never remains long on one tree, and when descending it always proceeds head first. The cry is a sharp little "chick, chick, chick." The breeding season appears to be from February to May. The nest is a small pad of feathers, moss, and hair in a tiny hole in a tree. The four eggs are white spotted with red, and measure about ·7 by ·56. The birds when approaching the nest hole generally alight above it and run down into it.

Family Dicruridæ.

Drongos.

The Drongos, or King Crows, with their black plumage and forked tails, form one of the best defined families of the order. The nostrils are clear of the line of the forehead. The beak is stout and covered at the base by thick-set hairs, or plumelets, which partially conceal the nostrils; the upper mandible is keeled, the tip is more or less hooked and provided with a single notch. The rictal bristles are well developed. There are ten primary quills. The tail of ten feathers is deeply forked. Members of the family are found in Africa and South-eastern Asia. Of the six species which occur in Ceylon, four are referable to the genus *Dicrurus*, which has no crest and a normally forked tail. Two larger crested species are placed each in a separate genus. In *Dissemurulus* the tail feathers are proportionately longer than in *Dicrurus*, but the inner webs, though curling upwards at the end, are normally webbed. In *Dissemurus* the outermost tail feathers, in adults, are greatly elongated and racket-shaped, the central portion of the shaft being practically webless. In some localities our local species appear to undergo a certain amount of seasonal movement.

Key to Ceylon Dicruridæ.

I.—Length under 12 inches; no distinct crest. Genus *Dicrurus*.

(*a*) Lower tail coverts not white throughout.

(1) Lower plumage black.
Dicrurus ater minor (Black Drongo).

(2) Lower plumage dark gray.
D. leucophæus longicaudatus (Indian Ashy Drongo).

(*b*) Lower tail coverts unmixed white.

(1) Throat and breast gray.
D. cœrulescens (White-bellied Drongo).

(2) Throat and breast dark brown.
D. leucopygialis (White-vented Drongo).

II.—Length over 12 inches ; forehead tufted.

(*a*) Hind feathers of the tuft erect ; inner web of outermost tail feathers normal.
Dissemurulus lophorhinus (Ceylon Black Drongo).

(*b*) Hind feathers of tuft curving backwards ; terminal portion of outer tail feathers with a distinct racket in adults ; with an indentation on inner webs in young birds.
Dissemurus paradiseus ceylonensis (Larger Racket-tailed Drongo).

Dicrurus ater minor.

The Black Drongo.

Dicrurus ater (Oates, Vol. I., p. 312) ; *Buchanga atra* (Legge p. 386).

Description.—Plumage black glossed with steel blue ; in fresh specimens the gloss on the tail is slightly greenish ; primary quills rather rusty black. There is a small white spot at the lower corner of the gape, not always easily perceptible.

In young birds the wing quills and lower plumage are brownish ; the feathers of the abdomen are fringed, and the lower tail coverts barred with white, which gradually disappears as the birds grow older.

Bill, legs, and feet black ; iris brownish-red or red.

Distribution.—The Black Drongo is found all over India, and extends into China, Siam, and Java. The Ceylon race is a distinct sub-species, which may also possibly occur in the extreme south of India. It differs from other Indian forms by its smaller size and comparatively smaller tail. In Ceylon it is confined to the Jaffna peninsula and the coastal region of the Mannar District.

Habits.—Not uncommon in the localities in which it occurs. It frequents open and cultivated lands and scattered thorny jungle, perching on posts and exposed branches and swooping out on passing insects, then returning to its post of vantage. It often also perches on the backs of cattle. The note is a

rather melodious metallic whistle. The breeding season is probably mainly in April and May. The nest is a very shallow cup placed in the fork of a leafy branch. The outside is fairly thickly bound with cobwebs, the interior lined with fine grass. Three appears to be the normal number of eggs in Ceylon. They are of two types: one pure white, the other pale salmon colour with rather bold reddish-brown blotches. Average size about 1·00 by ·75.

Dicrurus leucophæus longicaudatus.

The Indian Ashy Drongo.

Dicrurus longicaudatus (Oates, Vol. I., p. 314); *Buchanga longicaudata* (Legge, p. 390).

Description.—Upper plumage metallic bluish-black with a gray tinge, which increases on the tail coverts; wing quills and tail lustred with greenish on the outer webs; lower parts dull grayish-black.

In young birds the plumage is dark brown; the lower parts are grayer than in adults, and the under tail coverts are tipped with white, which gradually disappears.

Bill, legs, and feet black; iris red.

Length 10·5; wing 5·2; tail 5·9; tarsus ·7; bill from gape 1·1.

Distribution.—Like the Black Drongo this species has a wide range over practically the whole of the Indian Empire, the Malay Peninsula, and Java, and is split up into geographical races. The small sub-species found in Ceylon appears to be a migrant, probably from Southern India. It occurs during the north-east monsoon on the east side of the Island. One or two specimens have been shot near Colombo in October, probably while on passage.

Habits.—Generally found on the edge of open spaces in heavy jungle and forest. It perches on some point of vantage high up in a tree, swooping out on insects and returning to its perch. Its calls are rather shrill and varied. It is not likely to be found breeding in the Island. The nest is of the usual Drongo type, and the eggs resemble the spotted eggs of *D. ater minor*, but are slightly smaller.

Dicrurus cœrulescens.

The White-bellied Drongo.

Dicrurus cœrulescens (Oates, Vol. I., p. 316; *vide* Legge, p. 394).

Description.—Upper surface black, strongly glossed with blue; throat and breast gray; abdomen, flanks, vent, and under tail coverts white.

Bill, legs, and feet black; iris red.

Length about 9·5; wing 4·75; tail about 4·5; tarsus ·75; bill from gape 1·05.

Distribution.—Found over practically the whole of India proper. Birds from South India appear to be darker and smaller than those from the North.

Birds from the extreme north of Ceylon, perhaps migrants from South India, are apparently nearer to typical *D. cœrulescens* than to *D. leucopygialis*, which is the form usually met with in Ceylon.

Habits.—Those of the next species. The nest and eggs, too, would be almost indistinguishable.

Dicrurus leucopygialis.

The White-vented Drongo.

Dicrurus leucopygialis (Oates, Vol. I., p. 316); *Buchanga leucopygialis* (Legge, p. 392).

Description.—Specimens vary considerably. In true *D. leucopygialis* from the south of the Island the upper plumage is black, glossed with steel blue; wings and tail brownish with a greenish-blue gloss; chin, fore-neck, and breast rusty-black; the lower abdomen often mixed with white; vent and under tail coverts white. Birds from up-country and the northern forest tract are paler; the throat and breast are a more grayish-brown, and the white of the vent extends further up the abdomen.

Bill, legs, and feet black; iris red.

Length about 9·5; wing 4·75; tail variable, about 4·50; tarsus ·75; bill from gape 1·05.

Distribution.—I am of opinion that this form is merely a sub-species of *D. cœrulescens*. It is peculiar to Ceylon, and is common all over the Island up to about 4,500 feet, except in heavy forest or in the Jaffna peninsula and that part of the Mannar District where the Black Drongo occurs.

Habits.—A familiar bird in the cultivated parts of the country; it may even be seen in Colombo gardens. It occurs also in open woods, the outskirts of chenas in the jungle, round tanks, &c. It is entirely insectivorous, and, like other Drongos, is fond of taking up a particular perch, from which it makes sallies. The ordinary note is a whistling cry. It is very pugnacious, and bullies birds far larger than itself if they come near. The breeding season is from March to May. The nest is a shallow cup, tightly wedged into the fork of a slender branch. It is lined with fine grass, and thickly coated outside with cobwebs. Three or sometimes only two eggs are laid. In general they are rather stumpy ovals slightly pointed at one end; some are more elongated. The colour is either pure white with bold brick-red markings, or pale salmon-pink more or less boldly blotched, chiefly at the large end, with red, and with a few fainter underlying marks of grayish-purple. Average size ·92 by ·69.

Dissemurulus lophorhinus.

The Ceylon Black Drongo.

Dissemurulus lophorhinus (Oates, Vol. I., p. 322); *Dissemurus lophorhinus* (Legge, p. 396).

Description.—Plumage black, highly glossed with blue on the head, hind-neck, throat, and chest; on the back, wing coverts, and tail the gloss is greener; flanks and abdomen rusty-black without any gloss. In immature birds the lower tail coverts and wing-lining are tipped with white.

Bill, legs, and feet black; iris dull brownish or dark yellowish-red.

Length, variable, up to about 14; wing 5·8; tail, in adults, up to 8; tarsus 1·05; bill 1·4.

The crest on the forehead is about ½ inch long, the foremost feathers are directed forwards, the hinder feathers erect, but not curved backwards.

Distribution.—Until lately this species was supposed to be peculiar to Ceylon, but recently it has been discovered in South Travancore, where it is not uncommon. In Ceylon it is restricted to the forests of the wet zone, from the Deduru-oya on the north to the Walawe river in the south-west. It is rarely found east of the Peak range, which it ascends to a height of about 4,500 feet.

Habits.—A forest bird, which is generally met with in pairs among the top branches of tall trees in the heart of the jungle. It is very noisy and has considerable vocal powers, being able to mimic the calls of many species of birds. I have also heard it imitate a cat in the most realistic manner. Like the other Drongos, it is entirely insectivorous, and takes its prey on the wing with a short swoop from a fixed perch to which it returns. The breeding season is about April. Little is known of its nidification, however.

Dissemurus paradiseus ceylonensis.

The Larger Racket-tailed Drongo.

Dissemurus paradiseus (Oates, Vol. I., p. 325 ; Legge, p. 399).

Description.—Plumage black with a strong metallic gloss of steel blue, except on the chin, lower abdomen, vent, and the greater part of the wing quills, which are dull black. In immature birds the wing-lining and under tail coverts are tipped with white, and the racket feathers are not fully developed ; but there is always, except in very young specimens, an indentation in the inner web of the long outermost feathers.

Bill, legs, and feet black ; iris brownish-red to deep red.

Length : Males 17 to 19 inches according to length of tail ; wing 6 ; tail 11 to 13 ; tarsus ·95 ; bill from gape 1·25. Females are rather smaller ; wing 5·8 ; tail 10 to 11.

The crest on the forehead is up to 1 inch in length ; the foremost feathers are almost erect ; the hind feathers curve backwards.

Distribution.—This Drongo is widely distributed over the greater part of India. It ranges eastwards into Hainan, and south-east through the Malay Peninsula to Java and Borneo. It is divided into a number of sub-species, the Ceylon form being distinguished by its small size, its comparatively short crest and shorter tail. It replaces the Ceylon Black Drongo in the drier forest tracts, especially in the north and east of the Island, but it is nowhere very abundant. It does not appear to ascend the hills above about 2,000 feet.

Habits.—Like the preceding species, this is a forest bird, and has much the same habits. Its notes are varied, and it is an expert imitator of many other birds. In addition, it has a beautiful clear tinkling call, which is generally heard in the early morning. Like most Drongos, it appears to have an inveterate hatred of Owls and Woodpeckers. It is generally met with in pairs or in small parties of four or five. The breeding season is from March to May. Three nests, of which I have data, were all found in roadside trees, where the road passed through heavy jungle. They were placed in slender forks at a considerable height from the ground, and resembled larger editions of the nest of *D. leucopygialis*, but were more loosely woven and not so tightly jammed into the fork. There are usually three eggs. They are broad ovals slightly pointed at one end. The ground colour is pinkish-white with a moderate amount of reddish-pink markings overlying more cloudy marks of grayish-purple. All the markings are inclined to be streaky, and are most numerous round the cap. Average size 1·06 by ·81.

Family Sylviidæ.

Warblers.

The Warbler family contains a very large number of species, found chiefly in the temperate and warm regions of the Old World. They are all of small size, and nearly all of plain appearance. The plumage of the nestling resembles that of the adult female, but is brighter. The nostrils are clear of the line of the forehead, the edges of both mandibles are smooth, or at times the upper mandible has a simple notch. The

tarsus is generally slim and fairly long, its hinder aspect is smooth. The toes also are slim and longish and well adapted for clinging round grass stems or thin sprays of foliage. The wing has ten primaries, the tail may have either ten or twelve feathers. The sexes are generally alike, and when any difference does occur, it is small.

All species have a complete autumn moult, in addition to a partial or complete spring moult. The spring moult is often accompanied by a distinct change in the shape and length of the tail. Several of our resident forms belong to species which undergo such a change. In this Island, however, such forms have a breeding season, which extends intermittently for over half the year, and it is interesting to note that in Ceylon birds the difference between the breeding and winter plumage is far less marked than in specimens from further north, where the breeding season is shorter and more defined.

The majority of the species are migratory, breeding in temperate regions and wintering further south. Not many of the migrant species, however, penetrate as far south as Ceylon, with the result that half the forms found with us are resident.

The Warblers have received their family name from their pleasing song, but as their vocal powers are generally exercised only in the breeding season, and as these powers are sadly lacking in our resident species, the name is rather misleading as far as Ceylon is concerned.

More than 100 species belonging to over 30 genera are found within Indian limits. Seventeen different species or subspecies have been recorded from Ceylon.

As the plumage generally is plain, and as the generic and specific distinctions are based on rather minute differences, the group presents certain difficulties, unless carefully studied. I have, however, endeavoured to make the key as simple and easy as possible. The forms found in Ceylon may be divided into three main groups :—

I.—Reed, Grass, and Bush Warblers with 12 tail feathers, short rounded feathers on the forehead, and without any bristles beyond the usual rictal bristles. Of these, we have eight species, nearly all of which are resident. They are

divided among seven genera. They are all restless little birds, which generally keep to reeds, long grass, or bushes, seldom taking long flights in the open. They spend most of their time actively threading their way among the grass-growth or foliage, to the upright stems of which their slim toes enable them to cling in the most characteristic attitudes.

II.—Tree Warblers, which have 12 tail feathers, and in which the feathers of the forehead are soft, disintegrated, and with somewhat produced shafts. In addition to the rictal bristles, there are some supplementary hairs in front of them. In *Hypolais* and *Sylvia*, however, these bristles are small, and are clearly visible only under a lens, in *Acanthopneuste* they are more strongly developed. Six species belonging to the above-mentioned three genera have been recorded from Ceylon. They are all migrants, and only two are regular visitors. They are generally found in trees, and not in bushes or long grass.

III.—Three resident and common species of Wren Warbler belonging to the genus *Prinia*, which has only 10 tail feathers. The feathers of the forehead are smooth, and there are no supplementary bristles. In their habits they much resemble the Grass and Bush Warblers with 12 tail feathers, and have the same attitudes when perching.

Key to Ceylon Sylviidæ.

I.—Reed, Grass, and Bush Warblers ; mainly resident. Tail of 12 feathers ; feathers of the forehead short and rounded ; no bristles on the margin of the forehead, except the ordinary rictal bristles near the gape.

A.—Under tail coverts extremely long ; tail only normally broad.

(*a*) Outer tail feathers less than three-quarter length of tail.

(1) Upper plumage streaky ; length under 5·5. *Locustella certhiola* (Pallas' Grasshopper Warbler).

(*b*) Outer tail feathers more than three-quarter length of tail; plumage dingy and not streaky.

(1) Length 7·5 or over.

Acrocephalus stentoreus brunnescens (Indian Great Reed Warbler).

(2) Length about 5·5.

A. dumetorum (Blyths' Reed Warbler).

B.—Under tail coverts more normal; plumage extremely dark and soft; tarsus long and stout; length about 6·5.

Elaphrornis palliseri (Palliser's Warbler).

C.—Small forms; length under 5.

(1) Crown rufous; back yellowish-green.

Orthotomus sutorius sutorius (Indian Tailor Bird).

(2) Upper plumage streaky.

Cisticola cursitans cursitans (Rufous Fan-tailed Warbler).

(3) Upper plumage ashy-brown.

Franklinia gracilis (Franklin's Wren Warbler).

D.—Under tail coverts extremely long; tail abnormally broad; length about 6.

Schœnicola platyura (Broad-tailed Grass Warbler).

II.—Migrant Tree Warblers. Tail of 12 feathers; feathers of forehead disintegrated and with lengthened shafts. Some supplementary bristles in front of the rictal bristles.

A.—No green in plumage, which is very plain.

(*a*) Length about 5. Forehead, crown, and upper plumage sandy-brown.

Hypolais caligata (Booted Tree Warbler).

(*b*) Length about 6. Forehead and crown gray or brownish-gray. Genus *Sylvia*.

(1) Crown dusky-gray; upper plumage grayish-brown.

S. althæa (Hume's Lesser White-throated Warbler).

(2) Crown brownish-gray; upper plumage earth-brown.

S. curruca affinis (Indian Lesser White-throated Warbler).

B.—Upper plumage some shade of green. Genus *Acanthopneuste.*

(1) Upper plumage bright green ; length about 5.
A. nitidus nitidus (Green Willow Warbler).

(2) Upper plumage dull green ; length about 4·2.
A. nitidus viridanus (Greenish Willow Warbler).

(3) Upper plumage very dark green ; length about 5·4.
A. magnirostris (Large-billed Willow Warbler).

III.—Resident Wren Warblers ; tail of 10 feathers ; plumage not streaked ; under tail coverts normal. Genus *Prinia.*

A.—Upper plumage deep bluish ash-colour; length about 4·75.
Prinia socialis socialis (Ashy Wren-Warbler).

B.—Upper plumage dusky-brown.

(1) Length 6 or over.
P. sylvatica robusta (Jungle Wren Warbler).

(2) Length about 5·25.
P. inornata jerdoni (Southern Wren Warbler).

Locustella certhiola.

Pallas' Grasshopper Warbler.

Locustella certhiola (Oates, Vol. I., p. 352; Legge, p. 548).

Description.—Feathers of the head blackish-brown with olive-brown edges ; those of the back, scapulars, and wing coverts brownish-black with broad reddish-brown margins ; wing quills brown with pale rufous-brown margins ; rump reddish-brown ; upper tail coverts reddish-brown with a large black drop on each feather ; tail olive-brown with similar, but more irregular, black drops and rufous margins, the tips of all but the two central feathers whitish. A streak above the eye yellowish-white ; lores and a patch behind the eye brown ; chin, throat, and middle of abdomen whitish ; rest of lower plumage buff, darkening on the flanks and lower tail coverts to chestnut-brown.

In young birds the under parts are tinged with yellow, and many of the throat feathers have dark centres.

Bill, upper mandible dark brown, lower pale horn colour; iris reddish-brown; legs fleshy-brown.

Length about 5·3; wing 2·35; tail 2·3; tarsus ·85; bill from gape ·7.

Distribution.—Legge obtained two specimens in the Muttu-rajawela swamp, north of Colombo, in February, 1877. This is the only Ceylon record. This species breeds in Northern Asia, and winters chiefly in China and the Malay Archipelago, but is not uncommon in the north-east monsoon in portions of Burma and India.

Habits.—A skulking little bird, which may on occasions visit us unnoticed. It should be looked for in grassy swamps and paddy fields. It lurks in the thick grass, and does not rise until almost trodden on, when it darts out to take cover again almost immediately.

Acrocephalus stentoreus brunnescens.

The Indian Great Reed Warbler.

Acrocephalus stentoreus (Oates, Vol. I., p. 356; Legge, p. 541).

Description.—Upper plumage olive-brown with a tinge of fulvous, more pronounced in some specimens, on the back and rump; wings and tail brown, the outer webs edged with the hue of the back; an indistinct pale eyebrow; lores dark brown; chin and throat grayish-white; lower cheeks and sides of neck generally streaky brown and white; lower parts from fore-neck pale fulvous, the flanks and the sides of the breast almost the hue of the back. In the breeding season the under parts are paler, and the feathers are much worn.

Bill, upper mandible dark brown, lower horny-pink; iris yellowish-brown; legs and feet plumbeous-black.

Length about 7·7; wing 3·2; tail 2·75; tarsus 1·05; bill from gape 1·02.

Distribution.—A resident among bulrush beds in swamps and tanks here and there in the dry zone of the low-country. Allied sub-species are migrant over a great part of India, breeding in Kashmir and other parts of the Himalayas or in Central Asia, and wintering in the plains.

Habits.—In Ceylon this Warbler appears to confine itself to bulrush beds. Its presence is generally detected by its harsh grating note, which is of great volume for the size of the bird. It is said to have a pleasing song in the breeding season. It is of very skulking habits, keeping mainly among the lower stems of the rushes and seldom showing itself. The food consists of flies and small insects. The breeding season is from June to August, and possibly also about March. The nest is a fairly deep cup of grass and strips of rush blades, lined with finer materials and wedged in among bulrush stems, to which the outer wall of the nest is attached. The two or three eggs are of pale greenish-gray, rather thickly, but irregularly, marked with blotches and spots of black, yellowish-brown, and grayish-purple. Average size of eight Ceylon eggs ·81 by ·60.

Acrocephalus dumetorum.

Blyth's Reed Warbler.

Acrocephalus dumetorum (Oates, Vol. I., p. 359; Legge, p. 545).

Description.—Ear coverts, sides of neck, and all the upper plumage olive-brown, paling slightly towards the tail coverts; the colour varies a little with different specimens; wings and tail deeper brown, edged on the outer webs with the hue of the back; an indistinct pale streak over the lores to the eye; lores dusky-brown; lower plumage pale buff, almost white on the chin, throat, and abdomen.

Bill dark brown, lower mandible horny-pink; iris olive-brown; legs, pale horn colour.

Length 5·5; wing 2·4; tail 2·1; tarsus ·85; bill from gape ·7.

Distribution.—A familiar migrant found during the north-east monsoon over the whole of the low-country and in the hills up to about 4,500 feet. It breeds on the Himalayas and in Northern Asia, and occurs in winter over all India and most of Burma.

Habits.—Unlike the other members of the genus this species avoids reeds, and is generally found skulking in thick bushes or low bushy trees, hunting for the small insects on which it feeds. On arrival in the Island it appears to remain with great regularity in the quarters which it has taken up for the season. It seldom appears in the open, but makes its presence known by its note, a sudden "chik." Towards the end of its stay it occasionally essays a slight warble, but its full song is developed only in the breeding season and so is not heard in Ceylon.

Elaphrornis palliseri.

Palliser's Warbler.

Elaphrornis palliseri (Oates, Vol. I., p. 191; Legge, p. 514).

Description.—Upper plumage olive-brown with a rusty tinge on the rump, upper tail coverts, and tail; wings dark brown, edged on the outer webs of the feathers with the hue of the back; the centre of the tail feathers rather darker than the margins; a faint whitish streak over the eye; ear coverts dusky-brown; lores adjoining the gape whitish; underneath the eye dusky-brown; chin whitish, deepening into rusty buff on the throat and gorget; centre of abdomen yellowish; rest of lower parts slaty-olive, tinged with rufous on the flanks, thighs, and under tail coverts.

In young birds the chin is dusky-gray; there is a slight tinge of buff across the centre of the throat, while the breast and lower parts are more greenish than in adults.

Bill, black above, slate coloured beneath; iris clear red in males, buff in females; legs and feet deep brown or purple-brown.

Length 6·5; wing 2·4; tail 2·6; tarsus 1; bill from gape ·8.

The position of this species is not yet exactly determined. It shows in its plumage and structure affinities with both the *Timeliinæ* and the Warblers. The nest and eggs rather resemble those of a North Indian genus—*Tribura*—of Warblers, and it is now supposed to be an aberrant species of Warbler.

Distribution.—Peculiar to Ceylon, and confined to the main hill ranges over about 5,000 feet.

Habits, &c.—Fairly common in the dense undergrowth of the forests on the higher hill ranges. It seldom appears in the open, but threads its way under cover with great activity in search of insects and small seeds.

I once, however, watched a bird come out of the jungle and flit about the bushes in the garden of the Forest bungalow at Pattipola. It was intensely restless, never staying long in one position. Several of its attitudes were those of a Warbler, especially when it perched on a downward-hanging spray with its feet wide apart, the lower leg stretched out, and the upper bent almost double. The call is likened by Legge to the sound "quitze," and is a sharp insect-like note. It also has a rapid little warble.

The nest has been found by Captain Aldworth and by myself on the edge of the jungles round the Horton Plains in April. My nest was about 3 feet from the ground in a wild box bush, which stood by the side of a path where it ran through a little grassy space in the jungle. It was a fairly massive deep cup of moss, lined inside with carefully woven blades of soft dry grass. It contained two rather incubated eggs. They were oval, and only slightly pointed at the small end. The colour was whitish-pink, thickly powdered all over with rather deeper purplish markings and with one or two long hair-lines of deep brown at the larger end. Size ·90 by ·67.

Orthotomus sutorius sutorius.

The Indian Tailor Bird.

Orthotomus sutorius (Oates, Vol. I., p. 366; Legge, p. 517).

Description.—Forehead and crown rufous, shading into ashy on the nape; back, scapulars, rump, and upper tail coverts yellowish-green; wing quills and tail feathers lightish

brown, the latter with pale tips, a sub-terminal bar of darker brown, and bases of the same colour as the back ; wing coverts and innermost wing quills edged with the hue of the back, the primaries with narrow pale edges ; lores, cheeks, throat, and lower parts whitish, tinged with yellow ; the flanks and sides of the chest ashy-gray ; thighs rufous ; a concealed black patch on either side of the throat.

In the breeding season the male acquires an elongated tail, the central pair of feathers being about 2·5, while the next pair are also longer than in the off season.

Bill, flesh coloured, darker on the ridge ; iris reddish-yellow ; eyelid rufescent yellow ; legs reddish flesh colour.

Length : Males out of breeding season about 4·3 ; wing 1·85 ; tail 2 ; tarsus ·75 ; bill from gape ·65.

Females are slightly smaller and with shorter tails ; wing 1·7 ; tail 1·25.

Distribution.—Found all over the Island from sea-level to the summits of the hill ranges. Various sub-species occur over the whole Indian Empire and extend into Siam and China.

Habits.—Equally common in town gardens, open country, or thick jungle. It is generally seen in pairs flitting about in bushes or garden foliage. The birds make their presence known at all times of the day by their little grating " tewick, tewick " but they are wonderfully unobtrusive, and will often build, and bring up their young just outside one's verandah without attracting any notice. They are particularly restless when breeding. Their food is comprised mainly of small insects. They may be found breeding almost throughout the year, except during long periods of dry weather. The nest is a beautiful little structure of vegetable cotton, fine grass, or other soft materials lodged in a pocket made by sewing together the edges of one or two broad leaves. In Ceylon there are usually only three, very occasionally four, eggs. The ground colour is generally pale bluish-green, at times almost white or even pinkish, with fairly bold splashes of pale brownish-red, chiefly at the larger end. Average size ·63 by ·45.

Cisticola cursitans cursitans.

The Rufous Fantail Warbler.

Cisticola cursitans (Oates, Vol. I., p. 374; Legge, p. 531).

Description.—Males in breeding season: Forehead and sides of crown uniform sepia brown, the feathers on the centre of the crown and the nape more or less indistinctly edged with rufous-gray; the rest of the upper plumage deep brown with broad tawny margins to all the feathers; rump uniform rufous-tawny; wings and wing coverts dark brown with fulvous margins; tail deep brown with lighter edges, the feathers with broad whitish tips and blackish sub-terminal bands, which are seen most clearly on the under side; above the black bar is a rufous patch, which is mainly confined to the inner web. Lores and eyebrow whitish; face and ear coverts rufescent, the latter with pale shafts; throat and lower parts white, deepening on the flanks, under tail coverts, and thighs into pale rust colour.

In the off season the head is more streaked, and the rufous patches on the tail disappear.

Females at all seasons have streaky heads.

Birds from the hills are darker and more plainly streaked than those from the low-country.

Bill flesh colour, the ridge and tip darker; iris grayish-yellow, or pale olive; legs pinkish.

Length about 4·3; wing 2·1; tail 1·3; in the off season about 1·5; tarsus ·75; bill from gape ·6.

Distribution.—Found in paddy fields, swamps, and grassy country all over the Island from sea level to the Horton Plains. Various races occur throughout India and over a great part of the Old World.

Habits.—This tiny little Warbler may be met with in any stretch of paddy field, grassy flat, or patana. It may be recognized by its curious spasmodic flight and the sharp little "chick, chick" which it utters while on the wing. On alighting it threads its way very quickly through the grass and is soon lost to sight. It appears to breed intermittently from November until June or even later, and probably rears several broods during the year. The nest is a deep tubular

little structure placed generally in the middle of a tussock of grass; the outer wall is laced on to the surrounding grass blades, the interior is lined with vegetable down felted with cobwebs or saliva.

The three or four eggs are white, thickly spotted, generally in a zone round the larger end, with brownish-red and purple. Average size ·61 by ·46.

Franklinia gracilis.

Franklin's Wren Warbler.

Franklinia gracilis (Oates, Vol. I., p. 376); *Prinia hodgsoni* (Legge, p. 523).

Description.—Male in breeding season: Upper plumage dusky ash-gray, the rump slightly paler, the wing quills dusky-brown with paler rufous edgings; the tail feathers with a whitish tip and a sub-terminal dusky patch seen most clearly on the under side; cheeks and lower parts white; the breast ash colour.

In the off season the upper plumage and tail are rufous-brown; the wings brown with broader rufous edges; the white of the lower parts is tinged with fulvous.

In females the pectoral band is lighter than in males, and not quite complete in the centre. They are slightly smaller than males.

Bill blackish; iris reddish; legs fleshy-yellow.

Length about 4·5; wing 1·75; tail 1·9 (in the off season up to about 2·25); tarsus ·7; bill from gape ·55.

Distribution.—This species appears to be confined to the south-east of the Island, its habitat being roughly bounded by a line drawn from Batticaloa through Madulsima and the southern slopes of the Uva range to the south coast, a few miles east of Tangalla. It occurs over the greater part of the Indian Empire.

Habits.—Decidedly a Bush and not a Grass Warbler. It frequents the edges of low jungle, underwood by the sides of paths, and deserted chenas in which the growth is springing up. It frequently goes about in little family troops. The flight is weak, and the usual note a feeble little twitter. The breeding season appears to be about June. The nest is rather

like that of a Tailor Bird, and is composed of fine grass stitched with cobwebs, silk, or wool, into the cavity of a leaf which is drawn round it. There seem to be three eggs ; the ground colour is pale blue, in one type unspotted, in another finely speckled with brownish or purplish-red, often in a zone round the larger end. Average size ·59 by ·42.

Schœnicola platyura.

The Broad-tailed Grass Warbler.

Schœnicola platyura (Oates, Vol. I., p. 384 ; Legge, p. 532).

Description.—In the breeding season the upper plumage including the sides of the head and neck, is ruddy-brown ; wing quills darker brown with brighter margins ; tail brown with distinct dark cross-rays, the tips of the feathers paler ; lores and an indistinct streak above the eye whitish ; chin, throat, and centre of abdomen pure white ; rest of lower plumage tawny-brown.

In the off season the upper plumage is duller, the whole lower plumage is whitish fulvous, the colour being most pronounced on the breast and flanks ; the under tail coverts are darker and tipped with dull white.

Bill black above, pale horny below ; iris olive-brown ; legs and feet pale brownish.

Length 6 ; wing 2·6 ; tail 2·7 ; tarsus ·9 ; bill from gape ·65.

Distribution.—A single specimen from Ceylon is in the British Museum. The exact locality is not known.

It is found on the west coast of India, from Belgaum to Travancore, and appears to be resident throughout its range.

Habits.—Possibly a rare resident species, which should be looked for skulking in the long grass at the edge of paddy fields and on the outskirts of the jungle. Messrs. Cave and Symons believe they once saw two specimens in lantana scrub near the Government bungalows in Colombo. In South India it breeds about September. The nest is a ball of grass, with the entrance at one side, and is placed in a tussock of grass close to the ground. The four eggs are white spotted with brownish-red, and measure about ·73 by ·6.

Hypolais caligata.

The Booted Tree Warbler.

Hypolais caligata (Oates, Vol. I., p. 393 ; not in Legge).

Description.—Upper plumage sandy-brown; rump rather lighter ; wings and tail dusky-brown with paler margins, the outer tail feathers lighter and with broader, almost pearl white margins ; lores brownish ; a pale buff streak from the nostrils over the eye ; whole under plumage pale buff, the throat and centre of abdomen nearly white.

Bill brown above, fleshy below ; iris dark brown; legs and feet pale brown.

Length 5 ; wing 2·35 ; tail 1·95 ; tarsus ·75 ; bill from gape ·55.

Distribution.—A recent addition to our list ; two specimens which have been kindly identified for me by Mr. Stuart Baker were procured by the Museum Collector on February 15, 1905, one at Mannar and one at Giant's Tank, 14 miles away. The distance apart of these two localities would appear to indicate an incursion of this species that year. Another specimen was procured in the Mannar District in February, 1921. This Warbler summers in Turkestan and Southern Siberia, and winters generally in Northern and Central India.

Habits.—A slender little bird, which is of the same genus as the English Icterine Warbler. It flits about the lower branches of trees and among bushes in search of insects. A good lookout should be kept in the north-west of the Island from November to February for this and other rare migrant Warblers. It is quite possible that specimens visit us from time to time unnoticed.

Sylvia althæa.

Hume's Lesser White-throated Warbler.

Sylvia althæa (Oates, Vol. I., p. 397 ; not in Legge).

Description.—Upper plumage mainly grayish-brown ; the crown rather dusky-gray, the back more tinged with brown ; wings dark brown with paler edges, the innermost quills almost the same hue as the back ; central tail feathers dusky-brown with pale margins, the outermost pair almost wholly

white, only the base of the inner web and the shaft being brown, the remaining feathers have white tips, which are often abraded ; the lores, round the eye, and the ear coverts dark brown ; lower plumage, including the edge of the wing and the wing-lining, ashy-white.

Bill brownish-black, slaty-blue at the base of the lower mandible ; iris brown ; legs and feet plumbeous black.

Length 6 ; wing 2·7 ; tail 2·5 ; tarsus ·85 ; bill from gape ·6.

Distribution.—Breeds in Kashmir and winters on the plains of India. There are several specimens in the Colombo Museum obtained at Mannar in February.

Habits.—A rare migrant, which should be looked for from November to February, especially in the north-west of the Island. It appears to keep chiefly to trees, but also frequents bushes, hedgerows, &c.

Sylvia curruca affinis.

The Indian Lesser White-throated Warbler.

Sylvia affinis (Oates, Vol. I., p. 397 ; Legge, p. 538).

Description.—This form differs from *S. althæa* in being slightly smaller and having the plumage earth-brown with a grayish tinge ; the forehead, crown, and nape are brownish-gray.

Bill dusky, slaty horn colour at the base of the lower mandible ; iris yellowish-brown ; legs and feet plumbeous.

Length about 6 ; wing about 2·55 ; tail 2·2 ; tarsus ·75 ; bill from gape ·55.

Distribution. The present sub-species is merely the eastern form of the Lesser White Throat, which is found over a great part of Europe. The eastern race breeds partly in Kashmir, but mainly, apparently, in Siberia, wintering in the plains of India. There is a specimen in the Colombo Museum from the Eastern Province.

Habits.—Like the last species, this is apparently one of the migrants which on rare occasions penetrate as far south as Ceylon in the winter. It may be looked for from November to February. The habits are much the same as those of the last species.

Acanthopneuste nitidus nitidus.

The Green Willow Warbler.

Acanthopneuste nitidus (Oates, Vol. I., p. 413); *Phylloscopus nitidus* (Legge, p. 551).

Description.—Upper plumage and sides of neck fairly bright yellowish-green; wing coverts, wings, and tail brown, edged with the hue of the back, the greater coverts with pale yellow tips, forming a slight wing bar; lores and behind the eye olive; a distinct yellow streak from the nostrils over the eye to the nape; under parts almost primrose yellow; the wing-lining brighter yellow.

Bill brown above, paler beneath; iris dark brown; legs and feet olive-gray.

Length about 5; wing 2·4; tail 2; tarsus ·8; bill from gape ·6.

Distribution.—A fairly common visitor during the north-east monsoon over the whole Island. It is found in winter throughout practically the whole of India westwards of Calcutta. Its summer quarters are probably in Kashmir and on the Himalayas.

Habits.—Generally seen in the upper branches of leafy trees, being especially fond of jak trees. It keeps up a perpetual little chirrup, and like the Flycatchers, darts out from its perch to capture passing insects.

Acanthopneuste nitidus viridanus.

The Greenish Willow Warbler.

Acanthopneuste viridanus (Oates, Vol. I., p. 414); *Phylloscopus viridanus* (Legge, p. 555).

Description.—Upper plumage dull olive-green, lighter on the rump; wing and tail quills brown, edged with olive-green; the wing coverts with broader olive edges, and the greater coverts with tips of the same colour, forming a wing bar; a yellowish stripe over the eye; lores and behind the eye brown; ear coverts greenish-yellow; lower plumage pale grayish-yellow; wing-lining pale yellow. In summer the plumage is paler, and just before the moult the wing bar often disappears owing to the abrasion of the tips of the coverts.

Bill dusky-brown above, paler below; iris dark brown; legs and feet brownish-gray.

Length 4·2; wing 2·2; tail 1·7; tarsus ·7; bill from gape ·6.

Distribution.—This sub-species breeds in some part of the Himalayas and winters over a great part of India. Stray specimens probably visit Ceylon on occasions.

There is a single specimen in the Colombo Museum obtained at Ratnapura in March, 1909.

Habits.—Much the same as those of thepreceding sub-species. Specimens may be looked for during the north-east monsoon.

Acanthopneuste magnirostris.

The Large-billed Willow Warbler.

Acanthopneuste magnirostris (Oates, Vol. I., p. 415); *Phylloscopus magnirostris* (Legge, p. 553).

Description.—Upper plumage very dark olive-green, darkest on the head; wing coverts and wing brown, edged with rather brighter olive-green, the median coverts have small and the greater coverts broader yellowish-white tips, forming two wing bars; these bars tend to disappear towards the moulting season owing to abrasion; tail feathers brown, with olive-green edges on the outer webs and pale tips on the lower surface. A yellowish-white streak over the eye; lores and behind the eye brown; lower plumage pale grayish-yellow; wing-lining pale yellow.

Bill dusky-brown above, paler beneath; iris earth-brown; legs and feet bluish-gray.

Length 5·4; wing 2·7; tail 2·2; tarsus ·75; bill from gape ·65.

Distribution.—Like other Willow Warblers, this species breeds on the slopes of the Himalayas, and visits a great portion of India in winter. During the north-east monsoon it is common in many parts of the Island, especially in the drier forest tracts. It also occurs on the hills.

Habits.—Unlike the Green Willow Warbler, this species is not found near civilization, but prefers the jungle, where it

keeps to the upper branches of trees. In its ways it resembles the Flycatchers, and its call is a whistle of three notes, which also rather resembles that of Tickell's Flycatcher.

Prinia socialis socialis.

The Ashy Wren Warbler.

Prinia socialis (Oates, Vol. I., p. 450; Legge, p. 520); *Prinia brevicauda* (Legge, p. 1216).

Description.—Upper plumage, including the head to just below the eyes dark bluish ash colour; wings and tail umber-brown, the tail feathers are slightly cross-rayed and have whitish tips and sub-terminal black patches seen most plainly on the under side; wing coverts umber-brown, more or less washed with the hue of the back; lower parts and edge of the wing rusty-buff, the centre of the breast and throat almost white, the thighs and flanks darker.

In the off season there is no great difference. The hue of the back is a little more brown, the wing coverts less tinged with ashy, and the tail about ·3 inch longer. According to Legge, females have a more or less distinct streak of buff just above the lores and are paler underneath.

Bill black; iris pale red or brownish-yellow; legs and feet fleshy-red.

Dimensions a little variable. Length in breeding season about 4·75; wing 1·85; tail 1·8; tarsus ·75; bill from gape ·6; in winter the tail measures up to 2·1.

Distribution.—Fairly widely distributed over the Island, but nowhere very numerous. The species divided into various geographical races is found almost throughout India proper.

Habits.—This Wren Warbler is a permanent resident in the long *mana* grass of the patanas in Uva and elsewhere. In the low-country it wanders about a good deal, visiting fields of guinea grass when they are in growth and disappearing when they are cut. It is more permanent in the long grass round tanks and paddy fields and on the edges of jungle. The flight is feeble, but the birds are very active in threading their way through long grass stalks. The note is a feeble little warble. I have found the eggs in Uva in June and in the Puttalam

District from December to March. The nest is said occasionally to resemble that of the Tailor Bird, but is generally a neat little doomed structure of grass with the opening at one side. It is placed not far from the ground among tall grass stems, to which the outer wall is laced. The three eggs are of a glossy mahogany-red, the colour being deeper at the large end. Average size ·63 by ·47.

Prinia sylvatica robusta.

The Jungle Wren Warbler.

Prinia sylvatica (Oates, Vol. I., p. 451); *Drymœca valida* (Legge, p. 525); *Drymœca jerdoni* (Legge, p. 527).

Description.—Upper plumage dusky-brown with an ashy tinge on the sides of the neck; the margins of the wing and tail feathers a little brighter; the tail feathers have a whitish tip and a sub-terminal black spot, these marks show more plainly on the under surface, and are almost absent in the central pair; the whole tail is faintly cross-rayed; a whitish streak on the lores; cheeks brownish, blending into the pale buff of the chin and throat; the buff tinge is a little deeper on the chest and flanks; abdomen whitish; thighs and lower tail coverts pale fulvous brownish.

In Ceylon the seasonal change appears to be much less marked than in the North Indian races, in which the bill becomes paler, the plumage brighter, and the tail distinctly longer than in summer. Mr. Stuart Baker suggests that the smaller seasonal change many be due to the extended breeding season in Ceylon; our birds moulting at different times, whenever they happen to have finished breeding. The only difference I can find is that some specimens have paler bills than others. These are Legge's *Drymœca jerdoni*, and are probably either young birds or specimens in the off season.

Bill black, at times brownish, with a paler lower mandible; iris hazel; legs and feet fleshy.

Dimensions a little variable: length 6 to 6·4; wing 2·2 to 2·5; tail 2·4–2·8; tarsus ·8; bill from gape ·73.

Distribution.—The Jungle Wren Warbler is found almost throughout India proper west of Calcutta. It is divided into several sub-species, the Ceylon form being distinguished by

its much darker colour and smaller seasonal change. It is found over most of the low-country and up to about 3,000 feet, but on the Uva patanas it ascends to considerably higher elevations.

Habits.—A common species in low grassy jungles, in scrub by the sides of roads and paddy fields or in young chena growth, patanas, fern lands, &c. The note is a fairly loud chirp. The diet is insectivorous. The breeding season lasts from October to June. The nest is a woven ball of grass, with the opening at one side, and is placed low down in coarse grass or a thorny bush. Three or occasionally four eggs are laid. The ground colour is of fairly glossy pinkish-white, finely freckled all over with pale red. These markings often concentrate into a more pronounced zone or cap at the large end. I have seen two abnormal clutches and one egg of a normal clutch, in which the ground colour was clear white and the red freckles very faint and few. Average size ·71 by ·51.

Prinia inornata jerdoni.

The Southern Wren Warbler.

Prinia jerdoni (Oates, Vol. I., p. 453); *Drymœca insularis* (Legge, p. 529).

Description.—Upper plumage dull earthy-brown, the centre of the feathers slightly darker; forehead and forepart of crown tinged with rufous; rump much paler; wing and tail feathers brown with pale fulvous edges; the central tail feathers cross-rayed faintly; tips of tail feathers white with a sub-terminal black spot, which shows most plainly on the under side; a pale streak from the nostrils over the eye and a narrow white ring round the eye; lores at the corner of the eye brownish; lower plumage pale buff; the sides of the chest and belly more strongly coloured; flanks with a dusky tinge; thighs rusty-brown.

There is very little difference either in the plumage or in the length of the tail in the off season, though, on the whole, the plumage is slightly darker then. The seasonal change is far more marked in North Indian forms.

Bill black, the basal half of the lower mandible pale horny; iris pale reddish or reddish-yellow; legs and feet fleshy-pink.

Length about 5·25; wing 1·9; tail 2 to 2·3; tarsus ·8; bill from gape ·65.

Distribution.—This species has a wide range over India and Burma, and is divided into several sub-species. The Ceylon form occurs also in South Travancore. With us it is common round tanks and in paddy fields and grass lands in the low-country; on the hill patanas it occurs as high as 5,000 feet.

Habits.—The flight is weak and jerky, and the call a little "kink, kink, kink." The birds feed mainly on small insects and larvæ. The breeding season starts with the earliest rains in October or November, and lasts intermittently till June or even later. The nest is a neat little purse-shaped structure woven of thin strips of grass or reeds, the outer wall being laced round the long stems of grass in which it is placed. The opening is at one side. In the low-country the site generally chosen is a clump of reeds or long grass growing in or near water. Three or four eggs are laid; the ground colour is a beautiful clear blue with bold blotches in various shades of chocolate-brown and generally some interlacing lines of the same shade at the larger end. Average size ·60 by ·45. It is interesting to note that the ground colour of the eggs in the different sub-species varies considerably. Those from Ceylon are the deepest blue, further north the colour is not so rich; in Oudh it is white, and in Burma pink.

Family Laniidæ.

Shrikes.

The *Laniidæ* form a family group in which the plumage of the young is cross-barred, generally both above and below. All the members are insectivorous, and some of the larger true Shrikes tackle small birds, mice, frogs, &c. The bill is strong and generally both hooked and notched. Rictal bristles are present. The nostrils are clear of the line of the forehead, and are more or less overhung by bristles and hairs. There are ten primary quills and twelve tail feathers. There is only one moult a year in autumn.

Shrikes are found all over the world, except in South America, but are most numerous in Africa.

The family is divided into two sub-families :—

(1) *Laniinæ*, which comprises our true Shrikes, Pied Shrike, Wood Shrike, Minivets, and Cuckoo Shrikes.

In all these forms the first primary is not excessively small, and the folded wings do not reach beyond the middle of the tail.

(2) *Artaminæ*.—Swallow Shrikes—in which the forked wings reach to the tip of the tail ; the first primary is very minute, and the second primary the longest in the wing.

Sub-family *Laniinæ*.

True Shrikes, &c.

This sub-family contains rather a varied series of forms, most of which are wholly arboreal. The head is large for the size of the bird, and the crown is broad and flat. They may be divided into two groups. First, the true Shrikes, Pied Shrike, and Wood Shrike, in which the sexes are alike, or do not differ greatly, and the shafts of the rump feathers are soft. This group includes five species found in Ceylon : Three true Shrikes with predaceous bills and a distinctive mask-like, dark band across the face from the nostrils to the ear coverts ; the tiny Black and White Pied Shrike with a broad flat bill and the habits of a Flycatcher ; and the Wood Shrike an inconspicuously coloured little bird, with a strong bill well hooked and notched. The second group, in which the sexes, as a rule, are markedly different, and the shafts of the rump feathers are stiffened, contains four Ceylon species, the two gaily coloured little Minivets and two Cuckoo Shrikes. The latter are not so gaudily coloured and include one species, of the genus *Graucalus*, which is our largest Shrike. The sexes in this species do not differ greatly.

Key to Ceylon Laniinæ.

I.—Shaft of rump feathers soft ; sexes similar or almost so.

A.—Outer tail feathers much shorter than inner ; wing pointed.

(*a*) Bill deep and narrow, the tip well hooked and notched ; a conspicuous dark band from the nostrils through the eye to the ear coverts. Genus *Lanius*.

(1) Length about 9 ; forehead black ; crown and back pale gray.

L. schach erythronotus (Rufous-backed Shrike).

(2) Length about 7·5 ; forehead white ; crown rufous, and darker than the back.

L. cristatus (Brown Shrike).

(3) Length 8 ; forehead and front of crown grayish-white ; back of crown grayish-brown, like the back.

L. lucionensis (Philippine Shrike).

(*b*) Bill broad and flat, not greatly hooked ; size small ; length not quite 5·5.

(1) Cap of head and back glossy black.

Hemipus picatus picatus (Black-backed Pied Shrike).

B.—Tail square ; wing blunt ; bill strong, the tip well hooked and notched.

(1) Length about 6·25; upper plumage almost uniform ashy-gray.

Tephrodornis pondicerianus (Common Wood Shrike).

II.—Shaft of rump feathers spiny ; sexes generally markedly dissimilar ; wing pointed.

A.—Outer tail feathers less than half length of tail ; upper tail coverts fiery red, or bright yellow ; bill strong, legs weak. Genus *Pericrocotus*.

(1) Length 7·75 ; upper tail coverts red in males, yellow in females.

P. flammeus (Orange Minivet).

(2) Length just under 6 ; upper tail coverts red in both sexes.

P. peregrinus malabaricus (Small Minivet).

B.—Outer tail feathers more than three-quarters length of tail ; upper tail coverts some shade of gray.

(1) Length 7·75; bill comparatively weak; males: head black, back slate gray; females: upper plumage uniform brownish-gray.

Campophaga sykesi (Black-headed Cuckoo Shrike).

(2) Length 10·25; bill massive; sexes almost similar; upper plumage almost uniform slate gray.

Graucalus macii (Large Cuckoo Shrike).

Lanius schach erythronotus.

The Rufous-backed Shrike.

Lanius erythronotus (Oates, Vol. I., p. 464); *Lanius caniceps* (Legge, p. 383).

Description.—Forehead and a broad band through the eye to the ear coverts black; crown, nape, hindneck, sides of neck, back, and scapulars pale gray, with a white edging, more pronounced in some birds than in others, adjoining the frontal band; the ends of the scapulars more or less tinged with pale rufous; rump, upper tail coverts, and flanks rust colour; wing coverts and wing quills black, more or less edged with white or pale rufous, this is most noticeable on the inner quills; the edge of the wing and a band at the base of the inner primaries white; the three central pairs of tail feathers black, the rest brown with paler edges; chin, throat, and upper breast white; abdomen and lower tail coverts tinged with rust colour.

In young birds the upper plumage is pale sandy, darkening into rufous on the rump, and with wavy bars of brown; the central tail feathers are brown, tipped with rufous, and the band through the eye is blackish-brown.

Bill black; iris hazel; legs and feet blackish-brown.

Length 9; wing 3·6; tail 4·5; tarsus 1·05; bill from gape ·9.

Distribution.—Restricted to the Jaffna peninsula and the north-west of the Island. The species ranges over the whole of the Indian Empire to China and the Malay Archipelago, and is divided into various geographical races.

Habits.—Fairly common in scrub jungle near the sea throughout its range. It is rarely found far inland. It perches on the tops of trees and bushes, darting down to the ground on its prey, which consists chiefly of grasshoppers, and returning to its perch. It also feeds on frogs, which it impales on thorns in the regular Butcher Bird fashion. It is noisy and restless in the mornings and evenings, uttering its harsh cry and flying from bush to bush. The birds breed from February till about May, building a cup-shaped nest of rough grass, stalks, and slender twigs, lined with rootlets or other soft material, and placed in a thorn bush. The eggs appear to be four in number. The ground colour is pale greenish or creamy-white, with blackish-brown spots, which frequently form a zone at the larger end. Average size ·91 by ·70.

Lanius cristatus.

The Brown Shrike.

Lanius cristatus (Oates, Vol. I., p. 468; Legge, p. 377).

Description.—Adult male: Forehead and a streak over the eye white; a broad black band from the nostrils through the eye to the ear coverts; the rest of the upper plumage and the lesser wing coverts reddish-brown, the colour being brightest on the crown, nape, and sides of the neck; the larger wing coverts and the wing quills dark brown with rufous edges, which are broadest on the secondaries; tail feathers reddish-brown with paler tips; cheeks, chin, and throat white; rest of lower plumage fulvous.

In females the black streak through the eye is smaller and brownish.

In young birds on their first migration the crown and back are of the same rufous brown hue; the lower surface is largely marked with wavy, narrow bars, especially on the breast and flanks; these bars disappear very gradually, most birds retaining slight traces of barring on the flanks.

The tip of the bill and the greater part of the upper mandible blackish, the remainder pale bluish; iris dark brown; legs and feet bluish-gray to blackish slate-colour.

Length 7·5; wing 3·45; tail 3·4; tarsus 1; bill from gape ·85.

Distribution.—A common migrant during the north-east monsoon. It spreads over nearly all parts of the Island, but is most numerous near the sea, especially in the dry zone. The species has a wide range, breeding in Tibet, Mongolia, and Siberia, and wintering in Southern Asia, from Southern China to India.

Habits.—Found in scrub land, hedgerows, the borders of jungle, &c. A restless bird, perching on the tops of bushes and uttering a harsh ill-tempered cry. It feeds chiefly on insects, especially grasshoppers, but occasionally takes small birds.

Lanius lucionensis.

The Philippine Shrike.

Lanius lucionensis (Oates, Vol. I., p. 469 ; Legge, p. 378).

Description.—Adult male : The forehead, the front of the crown, and a streak over the eye grayish-white ; a broad black band from the nostrils through the eye to the ear coverts ; hinder part of crown, back, scapulars, and sides of neck grayish-brown ; rump and upper tail coverts more rufous ; wing coverts and quills blackish-brown with pale rufous edgings, broadest on the innermost quills ; tail feathers rufous-brown, with paler margins ; chin, throat, and sides of neck white ; rest of lower parts pale buff.

In females the black streak through the eye is smaller and the under parts paler.

In young birds the upper parts are brownish-rufous with faint dark bars on the plumage ; the lower parts are wavily barred with brown.

The tip of the bill and most of the upper mandible dark brown, remainder paler ; iris brown ; legs and feet dull lead blue.

Length 8 ; wing 3·5 ; tail 3·5 ; tarsus ·9 ; bill from gape ·87.

Distribution.—A very rare north-east monsoon migrant ; it appears to have been seen in Nuwara Eliya and one or two other localities, and there is a fine specimen in the Colombo Museum taken at Haldummulla in February, 1906. This Shrike breeds in Northern China and winters chiefly in the

Philippines and Malay Peninsula. It occurs in the extreme South of Burma and in the Andamans, where it appears to be an occasional resident.

Habits.—Very much the same as those of the last species.

Hemipus picatus picatus.

The Black-backed Pied Shrike.

Hemipus picatus (Oates, Vol. I., p. 471 ; Legge, p. 375).

Description.—Crown, sides of head to a line a little below the eye, and most of upper plumage deep black, slightly glossed with green ; a more or less incomplete white collar across the back of the neck ; the feathers of the lower back and rump long and fluffy, the former mixed with and the latter broadly tipped with white ; wing coverts black with a white bar across the median coverts and the inner greater coverts ; wing quills black with white edges on some of the secondaries ; tail black, all save the middle feathers tipped with white, on the outer feathers the white extends to a large portion of the outer webs ; chin, cheeks, sides of neck, vent, and under tail coverts white ; rest of lower parts pinkish-ash colour.

In Ceylon specimens the females appear similar to the males.

Bill black ; iris reddish-brown ; legs and feet blackish.

Length 5·3 ; wing 2·3 ; tail 2·25 ; tarsus ·45 ; bill from gape ·7.

Distribution.—This small Shrike ranges over a large part of India and Burma, and extends east and south-east to Siam and Cochin-China. The sub-species found in Ceylon also occurs in the Indian Peninsula. It is widely distributed over most of the Island wherever there is forest or heavy jungle, but is commonest in the hills.

Habits.—Generally found in pairs in tall trees near the edge of forest or high jungle. It is plentiful about many up-country estates, where it is commonly mistermed the Black and White Flycatcher owing to its habit of darting out from its perch and catching its food, which consists entirely of insects, on the wing, much in the manner of the true Flycatchers. It is really far from shy, but owing to its fondness for the top branches of tall trees it frequently escapes notice. The constantly uttered little call is likened by Legge to the syllables

" tcheetiti, tcheetiti, tcheetiti—chee." The breeding season probably extends from about February to May. The nest, which is hard to find, is a neatly made shallow little cup of grass and fine roots, covered outside with cobweb and flakes of lichen, and lined inside with soft fibres. It is placed in a fork or on top of a branch at some height from the ground. There are generally three eggs. They are elongated ovals in shape. The ground colour is greenish-white mottled with darker green and brown. Average size (of South Indian eggs) ·69 by ·49.

Tephrodornis pondicerianus.

The Common Wood Shrike.

Tephrodornis pondicerianus (Oates, Vol. I., p. 475); *Tephrodornis pondiceriana* (Legge, p. 372).

Description.—Upper plumage from forehead to tail coverts dark slaty-gray to ashy-brown, the tint varying with individuals; rump feathers tipped with white, upper tail coverts very dark brown; great wing coverts and wing quills rather more brown than the back, the inner quills with pale edges; tail feathers dark brown, the two outer pairs white, except at the base and tip; a more or less distinct whitish streak above the eye and a band of dark brown from the nostril through the eye to the ear coverts; this is bordered below by another whitish streak, which includes the chin and centre of the throat; rest of lower parts ash colour, which gradually merges on the abdomen into the white of the lower tail coverts.

According to Legge the browner specimens come from the north, but in the Colombo Museum there is a gray bird from the Northern Province, and both gray and brown birds from the Central and Southern Provinces; the difference appears to be largely individual.

Nestling birds are paler, are conspicuously spotted with white on the head, and have wavy markings on the wings; these markings gradually disappear.

Bill dark horn colour, lighter beneath; iris yellowish-brown; legs and feet dusky-slate colour.

Length 6·2; wing 3·3; tail 2·5; tarsus ·7; bill from gape ·9.

Distribution.—Rather locally distributed, but occurs over the low-country and up to about 5,000 feet in the hills. It ranges over practically the whole of the Indian Empire.

Habits.—Generally found in low spreading trees, such as *kaju* or *suriya*, round village compounds, by the roadside, on the edge of the jungle, &c. It is, for instance, fairly abundant in the avenues of *suriya* trees along the roads round Puttalam. It keeps very much to the shelter of the trees, hopping about among the leafy branches in search of insects. The cry is rather a plaintive little "weet, weet, weet."

The breeding season is from February to June. The nest is a very shallow cup, carefully felted into a fork, or on to the top of a bough, and so covered externally with lichen and cobwebs as to seem a mere natural excrescence of the bark. The lining is composed of soft fibres. The eggs, three in number, are dumpy ovals of pale grayish or greenish-white, rather thickly blotched with grayish-purple and brown. Average size ·77 by ·60.

Pericrocotus flammeus.

The Orange Minivet.

Pericrocotus flammeus (Oates, Vol. I., p. 482 ; Legge, p. 363).

Description.—Adult male : The whole head, throat, back, and scapulars glossy black ; lower parts from breast downwards, rump, and upper tail coverts brilliant orange-red ; wing coverts and quills black with a broad band of the same colour as the rump running across the quills from the outer web of the fifth primary ; a spot of the same fiery hue on the ends of the inner secondaries and of the greater coverts ; central tail feathers and the bases of the others black, remainder of tail fiery orange-red ; thighs dusky-black.

Females : On the wings and tail the orange-red markings of the male are replaced by bright yellow ; forehead and entire under plumage also bright yellow ; rump and upper tail coverts greenish-yellow ; top of head, hind-neck, back, scapulars, and lesser wing coverts dark bluish-gray ; lores almost black.

Immature males resemble females ; as they grow older they gradually assume adult plumage, birds in the transition state having a very patchy appearance.

Bill, legs, and feet black; iris reddish-brown in males, brown in females.

Length about 7·75; wing 3·55; tail 3·55; tarsus ·6; bill from gape ·8.

Distribution.—Found both in the hills, where it is fairly common, and in the low-country, where it is local. Both this and the next species appear to wander about a good deal, and some birds may be migrants from India, where this species appears to be confined to the Western Ghauts.

Habits.—May be met with in the tops of trees in hill forests and patana woods. In the low-country it usually keeps to the big trees along river banks and round tanks. Out of the breeding season it usually occurs in little troops of one cock and several hens. The nest has been found in Uva in December, but the breeding season probably continues throughout the north-east monsoon. The nest is rather a thick-walled little cup composed of the finest twigs and coated externally with cobwebs and lichen. It is generally placed high up in a tree and is glued into a small fork, or on to the top of a slender bough. The eggs, apparently two in number, are of pale sea green, marked with pale yellowish-brown and grayish-purple. Average size (of Indian eggs) ·90 by ·67.

Pericrocotus peregrinus malabaricus.

The Small Minivet.

Pericrocotus peregrinus (Oates, Vol. I., p. 487; Legge, p. 366).

Description.—Male: Forehead, top of head, hind-neck, back, and lesser wing coverts dark ashy-gray; lores, cheeks, ear coverts, chin, and throat black; rump and upper tail coverts scarlet, with generally a whitish band at the junction with the gray of the back; the greater wing coverts and wing quills black, with a band of orange red across the inner primaries and the secondaries; the three central pairs of tail feathers black, the next pair with a broad orange red tip, the outer feathers orange red, except at the base; breast and flanks scarlet, the hue paling across the abdomen to orange-yellow on the vent and lower tail coverts.

Female : The gray parts of the upper plumage are more ashy ; wings and tail brownish, with much paler markings than in the male ; lower parts whitish-gray on the throat and breast, gradually changing into faint orange-yellow on the abdomen and lower tail coverts.

Bill black ; iris brown ; legs and feet black in males, brownish-black in females.

Length 5·9 ; wing 2·65 ; tail 2·65 ; tarsus ·6 ; bill from gape ·6.

Distribution.—This Minivet, divided into several geographical races, ranges over practically the whole Indian Empire and eastwards into Siam and Cochin-China. The present subspecies occurs in Ceylon and Malabar. It is found in suitable localities over most of the Island, but is more abundant in the north than in the damper south-west. It is fairly well distributed in the hills.

Habits.—Goes about in small troops, and has much the same habits as the preceding species, but is generally met with close to civilization, and not in the interior of forests. It is occasionally seen in Colombo. It feeds chiefly on larvæ and small insects. It appears to breed in April and May. The nest is a tiny edition of that of the Orange Minivet, and is placed in the same situations. The eggs are greenish-white, marked with brown and purple, and measure about ·7 by ·52.

Campophaga sykesi.

The Black-headed Cuckoo Shrike.

Campophaga sykesi (Oates, Vol. I., p. 493) ; *Lalage sykesii* (Legge, p. 369).

Description.—Male : Head, chin, throat, neck all round, and upper breast black ; back, scapulars, lesser wing coverts, and upper tail coverts slate gray, the tail coverts with paler margins ; median and greater wing coverts black with gray at the tips and on the outer webs ; primary coverts black with a narrow white edge on the outer webs ; primary quills black with narrow white edges to the outer and a large white patch on the inner webs ; secondaries with broader white borders and with a certain amount of gray on the outer webs of the

innermost quills; the central pair of tail feathers gray, the rest black, tipped with white; chest and flanks pale gray; abdomen, vent, and lower tail coverts white.

Female: The upper plumage, including the lesser wing coverts, brownish-gray; the rump and upper tail coverts rather lighter and with narrow dusky bars; the rest of the wing coverts and wing quills dusky-brown with fulvous white edges, the primaries with a large basal patch of the same colour on the inner webs; central tail feathers brownish-gray, darkening to brown at the tips, and with faint pale margins, the remainder blackish-brown with white tips; ear coverts streaked with white; cheeks, sides of neck, and lower plumage fulvous white, with numerous narrow dusky-brown bars, which disappear on the abdomen; vent and under tail coverts white.

In nestlings the lower surface is more closely barred than in the female; the upper plumage is slaty-brown, each feather with a white tip and a dusky sub-terminal bar.

Bill black; iris brownish-red in males, brown in females; legs and feet black in males, brownish-slate in females.

Length 7·5; wing 3·9; tail 3; tarsus ·8; bill from gape ·85.

Distribution.—Found over the greater part of the low-country, but most common in the maritime districts of the south-east and north. It ascends the hills to about 4,000 feet, and occasionally wanders to higher elevations. It occurs over the greater part of India proper.

Habits.—May be met with in a variety of situations, either in forest, low scrub jungle, hedgerows, or compounds. It is occasionally seen in Colombo. Out of the breeding season the males are solitary, the females and young associate in small troops. The birds hunt diligently among the foliage for larvæ and soft insects. Males have a clear whistle, females a chirping note. The breeding season appears to be about April. The nest is a small shallow cup made of fine twigs bound together with cobwebs and placed in the fork of a tree, often at the end of a horizontal branch. The two eggs are greenish-white, rather streakily marked with pale brown, and measure about ·86 by ·62.

Graucalus macii.

The Large Cuckoo Shrike.

Graucalus macii (Oates, Vol. I., p 496); *Graucalus macii* (Legge, p. 360).

Description.—Male: nostrils, lores, the feathers round the gape, and under the eye black; ear coverts blackish; upper plumage, face, and sides of neck slate-gray, sometimes with a bluish tinge; rump and upper tail coverts paler and with whitish tips; chin, throat, breast, and upper abdomen rather lighter gray, paling into white on the lower abdomen and vent; wing-lining and under tail coverts white; wing coverts blackish-gray with black shafts; wings black, the quills edged with white, and the outer webs of the inner feathers largely gray; central tail feathers ashy-gray, darker at the end and with pale tips, remainder black with grayish-white tips, the feathers towards the centre with gray bases. Most birds retain traces of darker cross-bars on the under surface.

In females the nostrils, lores, and ear coverts are brownish and the general tone of the plumage lighter.

In immature birds the lower parts are more or less heavily barred; in very young birds the upper plumage is tipped and margined with pale fulvous, and the lower parts are nearly pure white.

Bill, legs, and feet black; iris reddish-brown.

Length about 10·25; wing 5·9; tail 4·4; tarsus 1·05; bill from gape 1·35.

Distribution.—Not very abundant, but fairly widely distributed in the drier forest tracts of the low-country. It also occurs in Uva and at other medium elevations, where the rainfall is not too heavy. It ranges over practically the whole of the Indian Empire.

Habits.—Rather a shy forest bird, generally found in tall trees, especially in the neighbourhood of rivers and tanks. Single specimens are to be met with, but immature birds generally associate in small troops. The cry is a harsh "kur-eech." The food consists of caterpillars, beetles, &c. It breeds apparently in July and August, chiefly in palu trees. The nest, which is small for the size of the bird, is a shallow cup of small twigs, lined inside with grass and leaves, and

felted with cobwebs to the top of a branch, or in a fork high up in the tree. The three eggs are pale green, marked with brown and purple, and measure about 1·22 by ·9.

Sub-family *Artaminæ*.

Genus **Artamus.**

Swallow Shrikes.

These are birds of rather swallow-like form with long wings, which enable them to spend much of their time in the air. They feed on insects, which they capture invariably on the wing. They are easily recognized by the strong conical pale blue bill, which is slightly curved and pointed, but neither hooked nor notched. The nostril is nearly circular and almost entirely exposed. The first primary is very minute, but the second reaches to the tip of the wing. The tail is short and square; the legs and feet weak. The plumage is plain, and there is no difference between the sexes. Swallow Shrikes are found from India to Australia. Only one species occurs in Ceylon.

ARTAMUS FUSCUS.

The Ashy Swallow Shrike.

Artamus fuscus (Oates, Vol. I., p. 498; Legge, p. 666).

Description.—Lores black; head and hind-neck slate gray; back, scapulars, and rump smoky-brown, with a slight reddish tinge in fresh specimens; upper tail coverts whitish; wings and wing coverts dark slate gray, the larger primaries almost dull brown on the exposed portions, all the quills with a very narrow whitish margin on the tips and inner webs; tail dark gray, almost brown, with a whitish tip; chin, cheeks, and fore-neck slate gray, the chin and cheeks tinged with black; lower parts from the chest downwards dove gray with a vinaceous tinge, paling to white on the inner tail coverts, which are crossed with narrow, wavy, gray bars.

In young birds the upper plumage is duller, and the feathers have faint paler margins; the secondaries and inner primaries have broad white tips.

Bill milky-blue, blackish at the tip; iris dark brown; legs and feet slate colour.

Length 7·3; wing 5·2; tail 2·25; tarsus ·65; bill from gape ·95.

Distribution.—Widely distributed over the low-country. It is fairly common in Uva, but rarer in the Central ranges. In some districts it appears to be a partial migrant. It occurs throughout the greater part of the Indian Empire, and extends into Siam and China.

Habits.—May be found in small flocks round paddy fields, on open hillsides, tree-studded patanas, or clearings in the jungle. The birds perch in rows on tall branches, sallying out in twos or threes after insects, which are captured on the wing, or soaring for some time in the air and then returning to their perch. The breeding season is from February till about April. The nest is a shallow saucer of grass and roots loosely put together and placed generally at the junction of a palm frond with the stem, but at times in hollow trees, or on the surface of a large horizontal branch. There are usually three eggs, rather narrow ovals, slightly pointed at one end. The ground colour is creamy-white, marked with rusty-brown. Average size ·94 by ·68.

Family Oriolidæ.

Genus **Oriolus.**

Orioles.

With the Orioles we come to a group of families in which the young are streaked. Only one genus is found in India, and only one species is at all common in Ceylon, a second having occurred only as a rare straggler. In our Ceylon forms the adults are easily recognized by their rich yellow and black plumage. The young pass through several stages from the nestling phase, in which the upper feathers are greenish, tipped with yellow, and the lower parts white, streaked with brown, to the full adult dress.

The bill is about the same length as the head, the upper mandible is slightly curved, with the tip notched and hooked, the nostrils are horizontal slits, which stand clear of the feathers at the base of the bill, the rictal bristles are well pronounced. The wings are rather long and pointed, the first

primary is more than half the length of the second. The tail is of medium length and slightly rounded, the tarsus is short, but fairly stout, and is covered in front by transverse scales. Orioles are arboreal in their habits, and feed on fruits and berries. Their notes are rich and flute-like.

Key to Ceylon Oriolidæ.

A.—Crown of head rich yellow.
Oriolus indicus indicus (Black-naped Oriole).

B.—Entire head, throat, and upper breast black.
Oriolus luteolus luteolus (Indian Black-headed Oriole).

Oriolus indicus indicus.

The Black-naped Oriole.

Oriolus indicus (Oates, Vol. I., p. 502); *Oriolus diffusus* (Legge, p. 355).

Description.—Male : Lores, a band through the eye and the nape black ; remainder of body plumage bright yellow ; wing coverts bright yellow, the inner webs of the greater coverts and the whole of the primary coverts, except the tips, black ; primaries black with yellowish-white tips and margins, the secondaries with wider margins, and the innermost quills almost wholly yellow ; tail feathers black with yellow tips, which increase in width on the outer feathers.

In females the yellow of the back is tinged with green.

Bill pinky red ; iris rich blood red ; legs and feet lead colour.

Length 9·75 ; wing 6 ; tail 4 ; tarsus 1 ; bill from gape 1·4.

Distribution.—Layard notes two specimens shot in Colombo, the only Ceylon record. The species appears to be a migrant found in winter over a considerable part of the Indian Peninsula but nowhere common.

In Burma it is fairly abundant in Southern Pegu. The summer quarters are in China and Mongolia.

Habits.—Not much is on record concerning these, but it appears to be a forest bird, and less partial to cultivated districts than the next species.

Oriolus luteolus luteolus.

The Indian Black-headed Oriole.

Oriolus melanocephalus (Oates, p. 506 ; Legge, p. 357).

Description.—Male : Head, chin, throat, and fore-neck jet black ; remainder of body plumage rich yellow ; winglet black ; primary coverts black with yellow tips ; wing quills black, the primaries with narrow yellowish tips and margins, which are almost invisible on the first few quills ; secondaries with broad diagonal tips of brighter yellow, which increase on the innermost quills ; tail yellow, with a broad patch of black on the four central feathers and a smaller black area on the third pair.

In females the yellow of the back and breast is less bright and generally tinged with green.

In nestlings the feathers of the upper plumage are greenish with yellow tips, the lower plumage is white streaked with brown. As soon as the young are fully fledged, the yellow tips on the upper plumage disappear, the streaks on the lower plumage turn black, and the whole plumage becomes more yellow. The adult dress is assumed gradually from this stage.

Bill black in quite young birds, gradually changing to pink in the adult ; iris brown in the young, crimson in adults ; legs and feet dusky-bluish.

Length 9·5 ; wing 5 ; tail 3·2 ; tarsus 1 ; bill from gape 1·25.

Distribution.—This Oriole is found over the whole of India, except the north-west ; also in Burma, Ceylon, and the Andamans. The present sub-species, from South India and Ceylon, is distinguished by its smaller size, and the less amount of yellow on the wing. It is found all over the Island, wherever there are trees, either in gardens or forest, up to about 6,000 feet and occasionally higher.

Habits.—It is by no means shy, and may be seen close to human habitations. The breeding season extends throughout the north-east monsoon, from October to May. The nest is a deepish cup of grass and strips of bark, suspended by the rim from a horizontal fork at the extremity of a leafy branch. The eggs are two in number, very rarely three. They are

pointed ovals of a pinkish-white or pale cream colour, and sparingly marked with spots of dark reddish-brown, occasionally almost black. Average size 1·10 by ·79.

Family Eulabetidæ.

Genus **Eulabes.**

Grackles.

The Grackles, or Hill Mynahs, comprise two Ceylon species, which in many respects resemble large Mynahs. They differ, however, sufficiently to justify their separation into another family, the chief outwardly distinctive feature being the fleshy yellow wattles on the nape. Both Ceylon species have a brilliantly glossy black plumage with a patch of white on the wing. The bill is stout and somewhat curved, the oval nostrils are rather sunken and lie just clear of the feathers at the base of the bill. Rictal bristles are present, but are not very pronounced. The first primary is minute and the wings are long, but rather blunt ; the tail is short and nearly square, the tarsi are stout and the feet strong. The call is a melodious whistle, and the birds can be taught to speak or to whistle a few bars of a tune. They are strictly arboreal and feed on fruit.

Key to Ceylon Eulabetidæ.

A.—A patch of bare skin under the eye ; base of lappets prolonged forward into a V-shaped ridge.

Eulabes religiosa religiosa (Southern Grackle).

B.—No bare skin under the eye ; base of lappets not prolonged forward.

Eulabes ptilogenys (Ceylon Grackle).

Eulabes religiosa religiosa.

The Southern Grackle.

Eulabes religiosa (Oates, Vol. I., p. 510 ; Legge, p. 682).

Description.—Whole plumage rich black, glossed with purple on the head, cheeks, and hind-neck, and with greenish on the rest of upper parts and throat ; the feathers of the

wing coverts and lower parts are glossed on the margins with green, and those of the side of the breast with bronze and purple ; a patch of white on the first eight primary quills.

The wattling consists of a stripe of bare yellow skin running backwards from the eye to the side of the nape, where it coalesces with a similar stripe from the side of the crown to form a broad lappet ; there is also a square, naked patch just under the eye.

In young birds the lappets are only slightly developed and the plumage is more or less devoid of gloss.

Bill orange-yellow ; iris brown, the outer edge white with darker mottlings ; legs and feet lemon-yellow.

Length about 9·75 ; wing 5·7 ; tail 2·8 ; tarsus 1·2 ; bill from gape 1·4.

Distribution.—Found rather locally through the wet and medium zones up to about 1,500 feet. It occurs in the hilly and well-wooded portions of South India.

Habits.—This species is found in well-wooded country, on the borders of open spaces, round tanks, by river banks, &c., but is absent from the heart of heavy forest. It is rather capricious in its distribution, and seldom wanders from its usual haunts. The cry is a shrill whistle, higher and more metallic than that of the next species. It is generally seen in pairs or small parties in the tops of tall trees, where it feeds on fruit and berries. The breeding season appears to be from June till about August. The nest is placed in a natural cavity in a tree, or in the old nest hole of a Barbet or Woodpecker. The bottom is scantily lined with a few dead leaves, &c. The two eggs are of light greenish-blue blotched with purple and chocolate brown. Average size (of South Indian eggs) 1·3 by ·88.

Eulabes ptilogenys.

The Ceylon Grackle.

Eulabes ptilogenys (Oates, Vol. I., p. 513 ; Legge, p. 685).

Description.—Whole plumage black, glossed mainly with purple ; a patch of white at the base of the first six or seven

primaries. The wattling is confined to two lappets of rich yellow skin, which spring from the sides of the nape. In old birds these lappets meet at the base.

Bill orange-red, the lower mandible for half its length and the upper mandible from the gape to the nostrils black; iris in males grayish-white mottled with brown, in females white or yellowish-white; legs and feet gamboge yellow.

Length 10·75; wing 6; tail 2·75; tarsus 1·35; bill from gape 1·4.

Distribution.—Peculiar to Ceylon. It occurs in the well-wooded parts of the main hill ranges from about 6,500 feet to 1,500 feet. In the forests westward of the Adam's Peak range it appears to descend almost to sea level.

Habits.—Much the same as those of the last species. The call is rather less shrill. The nest and eggs also closely resemble those of the Southern Grackle, and measure about 1·30 by ·98.

Family Sturnidæ.

Starlings and Mynahs.

The Starlings and Mynahs form a large group, with a marked family resemblance, found over a great portion of the Old World. Some species are migratory, others resident, but nearly all are gregarious. They are not nearly so arboreal as the Grackles, the greater portion of their food being obtained on the ground. The bill is generally moderately stout, only gently curved, or almost straight; but there is a distinct downward bend of the mouth near the gape.

There are no rictal bristles; the nostrils are rather narrow and almost horizontal; they stand clear of the line of the forehead, but the base of the bill is feathered down to their margins. The feathers of the crown and nape are elongated and in some species form a distinct crest. The first primary is minute. The tarsus is stout, and the feet large. Four genera, each represented by a single species, are found in Ceylon, and one genus, *Sturnornis*, is peculiar to the Island. In the migrant genus *Pastor* the wing is long and pointed, the tail short and square; in the other three resident forms the wing is blunt and the tail more rounded.

Key to Ceylon Sturnidæ.

A.—A noticeable long crest in adults ; no nude skin on side of head.

(1) Wings pointed ; throat and breast in adults black.
Pastor roseus (Rose-coloured Starling).

(2) Wings blunt ; lower parts reddish buff.
Temenuchus pagodarum (Brahminy Mynah).

B.—Feathers of crown and nape only moderately elongated ; a patch of bare skin on side of head.

(1) Throat and fore-neck gray with white shaft-streaks ; bare skin confined to a triangle behind the eye.
Sturnornis senex (White-headed Mynah).

(2) Throat and fore-neck black ; a large naked patch behind and beneath the eye.
Acridotheres tristis melanosternus (Common Ceylon Mynah).

Pastor roseus.

The Rose-coloured Starling.

Pastor roseus (Oates, Vol. I., p. 518 ; Legge, p. 673).

Description.—Summer : Head, neck, throat, upper breast, wings, and tail glossy black ; feathers of the wing-lining black, edged with white ; thighs, a patch on each flank, and the under-tail coverts black, tipped with white ; rest of plumage clear rose colour.

In winter the black feathers of the head, crest, neck, and throat are tipped with buff ; the feathers of the back and breast are rosy at the base and brown at the ends ; while the crest is not nearly so well developed ; at the end of winter the dull margins of the feathers wear off.

Females appear to be slightly paler, as a rule, and with a shorter crest.

In nestling birds the whole plumage is sandy-brown, the feathers of the crown have darker centres, and there is no crest ; the lower plumage is paler ; the foreneck is streaked with brown ; the wing and tail quills are dark brown, edged

with pale buff; after the first autumn moult the wings and tail become black, a patch of black appears on the upper breast, and the rosy tinge begins to appear on the back, breast, and abdomen; the full adult plumage does not appear to be assumed until the end of the second autumn.

Bill pinkish flesh-colour, the ridge brown; iris brown; legs and feet yellowish-brown.

Dimensions rather variable: length about 9; wing 5·2; tail 3; tarsus 1·25; bill from gape 1·15.

Distribution.—A rather uncertain migrant. It appears to breed in the Balkan Peninsula, in Western Asia from Turkestan to Asia Minor, migrating rather irregularly over a great part of Europe and Asia as far east and south as India and Ceylon.

Habits.—Occasionally a large flock visits the west and north of the Island; one such flock came to Puttalam for some weeks at the end of 1917. During their stay they frequent open grassy spaces and fields, feeding on grass seeds, grain, and insects. The whole flock roosts together in trees. The birds are generally extremely wary and difficult to approach.

Temenuchus pagodarum.

The Brahminy Mynah.

Temenuchus pagodarum (Oates, Vol. I., p. 533); *Sturnia pagodarum* (Legge, p. 677).

Description.—Forehead, crown, and the long crest on the nape glossy black; face, neck all round, and lower parts down to the abdomen reddish-buff, the feathers of the neck, throat, and breast elongated and with paler centres; upper plumage from the neck, wing coverts, and inner wing quills brownish-gray; primary quills rusty-black; tail brown with broad white tips, except the middle pair of feathers, which are dove gray shaded with brown; vent, thighs, and under tail coverts pearly-white.

Young birds have no crest, the cap of the head is dark brown, upper plumage ashy-brown, lower parts pale buff with a grayish tinge. The adult plumage is gradually assumed.

Bill bluish at the base, remainder yellow; iris pale topaz yellow; legs and feet pale yellow.

Length 8·25; wing 4·15; tail 2·75; tarsus 1·15; bill from gape 1·05.

Distribution.—Found only in the dry parts of the Island near the coast. It occurs in suitable districts over the whole of India proper.

Habits.—Although in India this species occurs far inland, with us it is never seen far from the sea. It is rather local, though plentiful where it occurs, as it associates in fairly large flocks, which from time to time shift their quarters to a distance of some miles. It is generally met with in scrubby country, or in grassy spaces dotted with bushes. The birds are wary and hard to approach. They feed chiefly on insects, small beetles, &c., but also on seeds and buds. They are said to breed in the north of the Island in July and August. The nest is a flimsy affair of grass and feathers placed in the hole of a tree. The eggs, three to five in number, are pale whitish-blue, and measure about ·97 by ·75.

Sturnornis senex.

The White-headed Mynah.

Sturnornis senex (Oates, Vol. I., p. 534; Legge, p. 680).

Description.—Adult: Forehead, front of face, chin, throat, and ear coverts buffy-white; remainder of upper plumage, including the wings and tail black with a greenish lustre; the feathers of the nape and neck with white shafts and those of the back faintly tinged with gray; the white of the upper throat passes into the lavender gray of the remainder of the lower parts, the fore-neck having conspicuous, narrow, white shaft streaks, which are less noticeable on the breast, flank, and abdomen; vent and lower tail coverts unstreaked, and almost the same shade as the throat.

In young birds the upper plumage has a brownish tinge, the white on the top of the head is confined to the forehead and eyebrow, the lower parts are darker, while the shaft streaks on the breast and abdomen are broader and less streaky.

Bill pale bluish-brown, leaden blue at the base; iris dull whitish with a narrow brown inner circle; eye-lid and skin round the eye dull bluish; legs and feet leaden blue.

Length 8·4; wing 4·3; tail 3; tarsus 1; bill from gape 1·1.

Distribution.—Peculiar to Ceylon, and confined almost entirely to the slopes of the Peak range and the Kukul korale in the Ratnapura District.

Habits.—A rare bird. It appears to be entirely arboreal in its habits, and goes about in small flocks feeding on fruits and berries in the tops of trees. It may be looked for in open spaces dotted over with solitary trees and clumps of jungle, or on the edges of forest and by the side of jungle paths. The nest has been found by Mr. F. Lewis in April. The nest hole was in a tree stem, and much resembled that of the Ceylon Grackle—*Eulabes ptilogenys*. It contained two pale blue eggs laid on the bare wood. They are rather pointed at the narrow end, and measure 1·01 by ·79.

Acridotheres tristis melanosternus.

The Common Ceylon Mynah.

Acridotheres melanosternus (Oates, Vol. I., p. 538; Legge p. 670).

Description.—Forehead, crown, and elongated feathers of the nape, with the feathered portion of the cheeks and ear coverts, glossy black; chin, throat, upper hind-neck, and fore-neck less glossy black; remainder of upper plumage, with wing coverts and secondaries dark vinous brown; primaries and tail almost black, the tail feathers with white tips which are sometimes abraded, the primaries with white bases; primary coverts, edge of wing, and wing-lining white, the outer webs of the outermost primary coverts black; sides of breast and flanks vinous brown; centre of breast, top of abdomen, and the thighs dull black; rest of abdomen, vent, and lower tail coverts white.

In young birds the brown of the plumage has a more rufous tinge, there is no crest on the nape, and the abdomen is tinged with rufous.

Bill yellow, the lower mandible blackish at the base ; iris brownish-pink, pinkish-gray, or at times whitish mottled with brown ; naked skin round eye yellow ; legs and feet light yellow.

Dimensions variable : length about 10 ; wing 5·6 ; tail 3·3 ; tarsus 1·6 ; bill from gape 1·35.

Distribution.—The Ceylon form of this bird is now recognized as merely a sub-species of *A. tristis*, which occurs over practically the whole of the Indian Empire. This Mynah is one of the most familiar birds all over the cultivated portions of the Island, and ascends to a considerable elevation in the hills.

Habits.—A gregarious species, going about during the day in small troops, which may be seen in gardens, coconut estates, grassy lands, &c., or perhaps most frequently in attendance on groups of grazing cattle, not only securing the insects stirred up in the grass by the animals as they move along, but also perching on the beast's backs to feed on parasites. At night they roost in colonies. The favourite roosting site is often a clump of reeds or low bushes in a marsh or large tank. In such a spot the birds often congregate at night in hundreds. As Mynahs are easily tamed and can be taught to speak and whistle, they are familiar pets. The breeding season extends from about March to August. The bird generally chooses for its nest an old Woodpecker's hole in the stem of a coconut palm, placing a pad of grass, roots, and fibres at the bottom of the cavity. The eggs usually number three, occasionally four, or even five. They are broad ovals of uniform pale bluish-green, slightly pointed at the smaller end, and measure about 1·16 by ·84.

Family Muscicapidæ.

Flycatchers.

The Flycatchers are an extensive group of birds, in which, as in the case of the next family, the Thrushes, the plumage of the nestling is normally mottled. They have, however, well-marked family characteristics. The bill is flat and pointed, in most species viewed from above it has the outline of an almost equilateral triangle, the upper mandible is simply

notched, and has a perceptible little hook at the extreme point. The nostrils stand clear of the line of the forehead and are covered by numerous hairs, which spring from the forehead and lie over them horizontally. These hairs are a most characteristic mark of the family, and are distinct from the rictal bristles. The rictal bristles themselves are generally strong and numerous. There are ten primaries and twelve tail feathers. The wing is generally moderate in length and pointed. All species have feebly developed legs and feet, they are incapable of walking, and few of them ever descend to the ground. They are all insectivorous, and catch their food by darting out in short flights from a perch, to which they return. Many of them are migratory. There is one moult a year, in the autumn, and in most species the young change into the adult plumage at the end of the first autumn. There is one notable exception among our Ceylon species, the fully mature plumage of the male, *Terpsiphone paradisi*, being acquired only in the fourth year.

Ten species, belonging to eight genera, occur in Ceylon. They fall into two groups. First we have seven species, including four migrants, in which the tail falls short of the wing in measurement. In all these seven species the bill is not long, and is almost equilaterally triangular in outline; the rictal bristles are, save in *Culicicapa*, only moderately developed; the wing is pointed and the tail square. The differences between the genera are largely based on the type of colouration, and are shown in the key which follows. In the resident forms of the above group the nest is either placed in a hole or ledge, or attached to the side of a rock or tree trunk. We next come to three forms which are resident, or, at all events, mainly so. These are distinguished by their longer tails, which are never square. The bill, though pointed and triangular, is generally longer than in the preceding group; the rictal bristles are long and numerous. In *Terpsiphone* the bill is large and swollen, and the rictal bristles are coarse. All three species build the most beautiful little cup-shaped nests, which are placed either in a slender fork, or glued on to the top of a thin branch. The young of the three species are not noticeably mottled.

Key to Ceylon Muscicapidæ.

I.—Tail shorter than wing.

A.—Fore-neck and breast, either rich chestnut, or ferruginous in adults.

(*a*) Upper plumage brown; upper tail coverts black; some white on tail.

Siphia hyperythra (Indian Red-breasted Flycatcher)

(*b*) Upper plumage generally blue; no black on tail coverts or white on tail. Genus *Cyornis*.

(1) Males blue above; chin and throat dusky-blue; females brown above; chin and throat dull rufous, like the breast.

C. rubeculoides rubeculoides (Blue-throated Flycatcher).

(2) Both males and females blue above: in males the chin feathers adjoining the bill black, remainder of chin and throat same colour as fore-neck; in females the dark chin-stripe is lacking.

C. rubeculoides tickelli (Tickell's Blue Flycatcher).

B.—Sexes alike; greater part of both upper and lower plumage ashy-gray tinged with blue.

Stoparola melanops sordida (Dusky-blue Flycatcher).

C.—Sexes alike; upper plumage plain brown, or rufous; lower parts white or inconspicuously coloured. Genus *Alseonax*.

(1) Upper plumage and tail ashy-brown.

A. latirostris (Brown Flycatcher).

(2) Upper plumage more ruddy brown; rump and upper tail coverts bright rufous brown.

A. muttui (Layard's Flycatcher).

D.—Plumage gray in front, yellow behind.

Culicicapa ceylonensis (Gray-headed Flycatcher).

II.—Tail as long as or longer than wing.

(*a*) Tail in males very elongated; a marked crest; head glossy black, rest of upper plumage chestnut, except in old males, when it is mainly white.

Tersiphone paradisi paradisi (Indian Paradise Flycatcher).

(*b*) No crest.

(1) Tail same length as wing; plumage mainly azure blue.

Hypothymis azurea ceylonensis (Indian Black-naped Flycatcher).

(2) Tail longer than wing and fan-shaped; upper plumage mainly brown; a broad band above the eye and most of lower parts white.

Rhipidura albifrontata. (White-browed Fantailed Flycatcher).

Siphia hyperythra.

The Indian Red-breasted Flycatcher.

Siphia hyperythra (Oates, Vol. II., p. 10); *Muscicapa hyperythra* (Legge, p. 428).

Description.—Male: Whole upper plumage to the rump dark ashy-brown; wing coverts and quills dark brown edged with the hue of the back; upper tail coverts and four central tail feathers wholly black, remaining tail feathers white for two-thirds of their length, on the outermost feather the outer web is black for over half its length; lores, cheeks, and sides of neck ashen; chin, throat, breast, and sides of abdomen rich chestnut bordered by a bold black stripe from the gape down to the sides of the breast; rest of lower surface white, tinged with rufous on the flanks and under tail coverts.

Female: Upper surface with a more earthy tint; the black of the tail less pronounced; lores and round the eye grayish; the chin, throat, and breast are duller, and lack the dividing black border.

Young birds are brownish, streaked and mottled with fulvous; the lower parts are grayish in front, whitish behind, the chestnut tint appears in dull mottled patches which spread and brighten, at the same time in males the black border begins to appear.

Bill brown above, paler near the forehead, the lower mandible and gape fleshy-yellow, the tip dusky; iris hazel brown; legs and feet deep brown.

Length about 4·8; wing 2·75; tail 2; tarsus ·75; bill from gape ·6.

Distribution.—A north-east monsoon migrant, found in the central Hill ranges over about 2,500 feet. The species breeds in Kashmir, and winters apparently only in Ceylon. It has been observed on migration in October in the Deccan, so would seem to migrate down the centre of the Indian Peninsula.

Habits.—Generally frequents the edges of forest, trees by the side of jungle paths, the strips of wood which line the streams in patana country, &c. It is irregular in its visits, being plentiful in certain localities one year and absent the next. The note according to Legge is a monosyllabic whistle, followed by a sharpe little trill, recalling somewhat the note of the Wheatear. It is restless and active in its movements, and is generally found solitary.

Cyornis rubeculoides rubeculoides.

The Blue-throated Flycatcher.

Cyornis rubeculoides (Oates, Vol. II., p. 23); *Siphia rubeculoides* (Legge, p. 424).

Description.—Male: Closely resembles that of the next sub-species, but is a little smaller and brighter. The distinguishing features are the throat and chin, which are dusky-blue.

Female: Upper plumage brownish-olive with a rusty tinge on the forehead, round the eye, and on the tail-coverts; wings and tail brown with paler margins to the quills; chin, throat, and chest dull rufous; flanks paler; abdomen and lower tail coverts white.

Young birds are brown streaked with fulvous, and with broad fulvous tips on the wing coverts; throat and breast bright fulvous mottled with brown; abdomen white.

Bill black, the gape flesh-coloured; iris brown; legs and feet grayish-blue.

Length 5·7; wing 2·7; tail 2·2; tarsus ·7; bill from gape ·7.

Distribution.—This bird is now considered to be a migrant form sub-specifically allied to *Cyornis rubeculoides tickelli*, which is a resident race. It breeds in the Himalayas, and winters over a considerable portion of the plains of India and Burma. In Ceylon it has been obtained by Legge and Layard during the north-east monsoon, but only in the Jaffna peninsula and the northern forest tract.

Habits.—A restless little bird which keeps to the undergrowth and lower branches in high jungle. The call is more varied and longer sustained than that of the following sub-species.

Cyornis rubeculoides tickelli.

Tickell's Blue Flycatcher.

Cyornis tickelli (Oates, Vol. II., p. 25); *Siphia tickelliæ* (Legge, p. 421).

Description.—Male: Forehead and a streak over the eye shining blue; upper plumage dull blue; wings dull brown, the outer webs of most quills washed with blue; tail feathers blue, the shafts and the greater part of the webs brown; lores, face, and chin feathers adjoining the bill almost black; remainder of chin, throat, and neck bright ferruginous; breast and flanks paler; abdomen and under tail coverts white.

Female: Resembles the male, but the upper plumage is lighter and has a faded appearance; lores whitish; cheeks bluish; no dark chin stripe; chin, throat, and breast paler ferruginous than in the male.

Young birds are streaked with fulvous, and resemble the young of the last sub-species.

Bill blackish; iris brown; legs and feet bluish-brown or bluish-gray.

Length 5·8; wing 2·8; tail 2·45; tarsus ·7; bill from gape ·75.

Distribution.—A resident form found over the greater part of the peninsula of India and portions of Burma. It is widely distributed over the whole of the Island up to about 4,000 feet wherever there is forest.

Habits.—Keeps to the undergrowth and lower branches in tall forest, and may occasionally be seen in untidy village gardens where there are jak trees. It is very active towards dusk. The call is a little whistling chirrup. I have taken eggs as early as February and as late as June. The nest is rather a deep little cup of dead leaves, moss and grass, lined with finer materials, and placed in holes in banks or trees. Three is the usual number of eggs. They are so thickly speckled as to seem almost uniform olive-brown, the colouring being often deeper at the larger end, owing to the greater density there of the markings. Average size ·77 by ·57.

Stoparola melanops sordida.

The Dusky-blue Flycatcher.

Stoparola sordida (Oates, Vol. II., p. 29; Legge, p. 419).

Description.—Head and body plumage in general dull ashy-gray tinged with blue, which is brightest on the crown; forehead, an indefinite streak over the eye, and the chin washed with bright cobalt blue; lores and the point of the chin black; abdomen, vent, and under tail coverts whitish; wing and tail quills dark brown edged with the hue of the back.

Young birds are dark brown above, each feather with a tawny centre and a blackish border; feathers of lower plumage grayish with dark borders. The change into adult plumage is gradual.

Bill black; iris red brown or brown; legs and feet dark lead colour.

Length about 6; wing 3; tail 2·4; tarsus ·75; bill from gape ·7.

Distribution.—The form found in Ceylon was for long supposed to be confined to this Island, but recently it has been discovered as not uncommon in the Travancore hills. It is a sub-species of *S. melanops*, which occurs over the greater part of the Indian Empire. Our bird is fairly abundant up-country at elevations over 2,000 feet, but chiefly in the higher hills.

Habits.—Rather a quiet shy bird, seen chiefly on the borders of hill streams in the jungle, by woodland paths, or on the outskirts of forest. It has a low clear song. It generally perches on logs, rocks, or on branches fairly close to the ground. The breeding season is from March to May. The nest is placed in the crevices of trees or on ledges in the banks of streams or of path cuttings. It is a deepish cup of moss, the outside wall being built up from the ledge on which it rests, and is lined with a few fine vegetable fibres. Two or occasionally three eggs are laid. The ground colour is dull white with minute red spots, which generally form a cloudy zone or cap at the larger end, leaving the rest of the egg scantily marked. Average size of a small series ·87 by ·58.

Alseonax latirostris.

The Brown Flycatcher.

Alseonax latirostris (Oates, Vol. II., p. 35 ; Legge, p. 415).

Description.—Upper plumage ashy-brown, the feathers of the crown with slightly darker centres ; a faint tinge of gray towards the rump ; lores and a thin ring round the eye whitish ; wing coverts and quills dark brown with ashy-white margins to the coverts and inner quills ; tail dark brown, the outer feathers with narrow whitish edges ; under parts white, the flanks, breast, and fore-neck tinged with ashy-gray.

In young birds the crown is blackish with fulvous streaks ; the upper plumage and wing feathers have large fulvous spots ; the lower plumage is mottled with brown. After their first moult young birds are more rufous than adults.

Bill black above, the lower mandible yellow with a darker tip ; iris brown ; legs and feet black.

Length 5·2 ; wing 2·8 ; tail 2·1 ; tarsus ·5 ; bill from gape ·65.

Distribution.—A migrant to Ceylon, found during the north-east monsoon over the low-country, but nowhere abundant. It does not appear to ascend the hills to a height of over 3,500 feet. The species ranges from Japan and Siberia in the north to India, Java, and the Philippines. It breeds mainly in the north of its range and on the Himalayas, but some birds appear to be resident in other parts of India, and a few loiter in Ceylon, as it has been obtained in the Island in June.

Habits.—A solitary, quiet, but tame bird, which frequently escapes notice. It generally keeps to the boughs of shady trees either in the forest or even in gardens in the middle of habitations and close to frequented paths. It sits motionless for long periods, darting out at times from its perch to catch insects.

Alseonax muttui.

Layard's Flycatcher.

Alseonax muttui (Oates, Vol. II., p. 36 ; Legge, p. 417).

Description.—Head and nape olive-brown, shading through the rufous-brown of the back into bright rufous-brown on the rump and upper tail coverts ; wing coverts and quills brown, edged with the hue of the rump ; tail brown, the outer webs washed with rufous ; lores and a conspicuous ring round the eye white ; ear coverts olive-brown ; chin and throat white ; cheeks, sides of neck, breast, and flanks yellowish-brown ; abdomen and under tail coverts white.

Bill dark brown above, pale horny yellow beneath ; iris hazel brown ; legs and feet pale yellow.

Length 5·4 ; wing 2·8 ; tail 2·1 ; tarsus ·55 ; bill from gape ·7.

Distribution.—This species apparently breeds in Sikkim and other parts of the Himalayas. It winters in Travancore and Ceylon, and seems to migrate down the centre of the peninsula, as it has been obtained in October in the Deccan, while on passage. As with the last species, some birds appear to loiter, for the first specimen recorded was obtained by

Layard at Point Pedro in June. It is an extremely rare bird, as yet noted only from the Jaffna peninsula, Trincomalee, and the Western Province.

Habits.—Not much is known about these, but they are probably much the same as those of the last species. It appears, however, to keep to the lower branches of trees by the sides of paths and small glades in the forest.

Note.—Ochromela nigrorufa—The Black-and-Orange Fly-catcher—is said to have occurred in Ceylon, but the evidence is doubtful. Layard identified a drawing of a bird obtained in June at Ratnapura by Mr. Mitford as being this species, which occurs on the hill ranges of South India in dense woods. The plumage is striking and unusual. In males the forehead, crown, nape, hind-neck, sides of head, and wings are black; the rest is rich orange, slightly paler on the abdomen; some of the wing coverts and inner quills have narrow orange tips. In females the black of the head is replaced by greenish-brown; the wings are dark brown and the orange parts are paler.

Length about 5; wing 2; tail 2·5; tarsus ·8; bill from gape ·6.

Culicicapa ceylonensis.

The Gray-headed Flycatcher.

Culicicapa ceylonensis (Oates, Vol. II., p. 38; Legge, p. 410).

Description.—Head, cheeks, and hind-neck dark ashy-gray, the feathers of the crown with darker brown centres; back greenish-yellow, the colour brightening on the rump and upper tail coverts; wing coverts and quills dark brown edged on the outer webs with the hue of the rump; tail dark brown, the outer webs of all but the two central feathers edged with the hue of the rump; throat, neck, and sides of breast pale ashy-gray; rest of lower parts bright yellow; wing-lining pale yellow.

Bill brown above, pale horny-yellow beneath; iris brown; legs and feet yellowish-brown.

Length about 5; wing 2·5; tail 2·1; tarsus ·55; bill from gape ·55.

Distribution.—In Ceylon a hill species which rarely descends below 1,000 feet. Above this elevation it is resident and in many localities common. It occurs over practically the whole of the Indian Empire, except in the north-west, being a permanent resident in the hills and a winter visitor to the plains. The range extends to Java and Borneo.

Habits.—A familiar species in most of the up-country forests and jungles. It frequents the lower branches of trees, especially by roadsides, streams, the edges of clearings, &c. It is generally found in pairs and flits about actively, hawking for insects. The whistle is compared by Legge to the syllables "tit-titu-wheee." The breeding season is probably about April and May. The nest is a little pocket of moss fixed to the trunk of a tree or against a rock; at times there is a lining of fine stalks or fibres, but frequently it is unlined. In India there are four eggs, but probably only three in Ceylon. They are dingy yellowish-white, finely speckled with brown and gray, chiefly in a zone towards the larger end. Average size ·61 by ·48.

Terpsiphone paradisi paradisi.

The Indian Paradise Flycatcher.

Terpsiphone paradisi (Oates, Vol. II., p. 45; Legge, p. 404).

Description.—Females and young males: Forehead, crown, crest, and nape glossy blue-black; cheeks, chin, throat, and all round the neck ashy-brown; on the fore-neck this colour gradually changes through the pale ash colour of the breast into white on the abdomen, vent, and lower tail coverts; upper plumage from the neck downwards, including wings and tail, chestnut; the inner webs of the wing quills duller brown; the tail is about 4·5 inches long.

The female continues in this plumage all her life, and the male until the second summer. He then gradually becomes blacker on the chin, throat, and hind-neck. After the second annual moult, the head and neck are hooded in glossy blue-black, which contrasts sharply with the ashy-gray of the fore-neck; the inner webs of the wing-quills are almost

entirely chestnut; at the same time the two central tail feathers grow to a length of 12 inches or more. After the third moult the breast grows lighter, and the bird gradually changes into the white plumage, the change being not complete until after the fourth moult, when the whole head, neck, and crest are glossy blue-black with a metallic sheen, and the rest of the body plumage white; the feathers of the back and rump have black shafts; the wing quills are black with white margins, which increase in width on the inner quills; the tail is white, with conspicuous black shafts and black borders on the outer webs of all but the central feathers.

Bill and eyelids cobalt blue; iris dark brown; legs and feet a rather paler blue than the bill.

Adult males: length 16·5 to 19·5; wing 3·75; tail 12 to about 15; tarsus ·7; bill from gape 1·05. Females: length about 9; wing 3·55; tail 4·5.

Distribution.—This Flycatcher is found over the greater part of India proper, and ranges west and north into Afghanistan and Turkestan. A closely allied form occurs in the East Himalayas and Burma. In Ceylon this species is subject to a good deal of seasonal movement, concerning which we have much to learn. In the north-east monsoon both young and old birds are found all over the low-country, but more abundantly in the drier forest tracts. It is not very common above 2,000 feet, but is occasionally seen at quite high elevations, and such visits are apparently increasing. About March the birds appear to migrate north and east to the drier forest tracts. Here the younger birds pair and breed freely from April to June or even later. Long-tailed red birds are not often observed during the south-west monsoon, and I have only once at this season seen a male in the full black and white plumage. They are either soon killed off, or else migrate to India.

Habits.—A fairly familiar bird, which is generally found in forest, or in shady spots not very far from water. It is by no means averse to the neighbourhood of man, and may often be seen in village gardens. It takes more extended flights after insects than many Flycatchers, and is less fond

of returning time and again to the same perch. The cry is rather a grating little single note. The breeding season is chiefly in April and May, but may occasionally extend as late as August. The nest is a beautifully built little shallow cup of fine grass, fibres, &c., bound together with cobwebs and lined with similar finer materials. I have generally found it placed about 6 feet from the ground in the fork of a downward slanting, thin, bare branch fairly close to the stem of the tree. With us there are generally three, often only two, eggs. The ground colour is pinkish-white, rather sparingly spotted, often in a zone, with brownish-red. Average size ·79 by ·60.

Hypothymis azurea ceylonensis.

The Indian Black-naped Flycatcher.

Hypothymis azurea (Oates, Vol. II., p. 49); *Hypothymis ceylonensis* (Legge, p. 408).

Description.—Male: Head, neck, back, rump, and upper tail coverts, throat, and chest azure blue, brightest on the head and throat; there is a distinct dividing line across the fore-neck between the two shades; the extreme point of the chin, the feathers adjoining the nostrils, and, in fully adult birds, a patch on the nape black; wing coverts and quills dusky-brown, the coverts washed, and the quills edged with the hue of the back; tail dusky-brown, the central feathers and the outer webs of the others washed with azure blue; abdomen, vent, and lower tail coverts white tinged at times with faint blue.

Females lack the black nape patch; the blue of the plumage is slightly duller and the brown lighter; the breast is ashy-blue, and the abdomen, flanks, and lower tail coverts tinged with gray.

Bill dark blue; iris dark brown; legs and feet bluish lead-colour.

Length 6·1; wing 2·7; tail 2·75; tarsus ·6; bill from gape ·65.

Distribution.—The form found in Ceylon is a good sub-species, in which the black nape patch is small, and the black bar across the throat wanting. It is fairly abundant in forest and high jungle throughout the low-country and in the lower hills. Allied geographical races are found almost throughout the Indian Empire.

Habits.—A forest species, generally found singly or in pairs in secluded spots, often near water. It keeps largely to the undergrowth or lower branches, and, like the last species, has a harsh little cheep. The nest is a dainty little cup of fine grass, coated with cobwebs, and placed in the fork of a young sapling among the forest undergrowth at no great height from the ground. The outside of the nest is generally an inverted cone in shape. There are two or three eggs, which are miniatures of those of the last species. Average size ·70 by ·52.

Rhipidura albifrontata.

The White-browed Fantail Flycatcher.

Rhipidura albifrontata (Oates, Vol. II., p. 52 ; Legge, p. 412).

Description.—Crown, lores, ear coverts, and the feathers round the eye rusty-black ; the forehead and a broad band over the eye to the nape white ; upper plumage and wings ashy-brown ; the wing coverts with white spots on the tips ; tail darker brown, the central feathers unmarked, the next pair with white tips, which increase in length on the outer feathers, the outside pair being almost entirely white ; lower cheeks, chin, and throat rusty-black, each feather edged with white ; lower throat and sides of breast unmarked rusty-black ; rest of lower parts white.

Females are slightly lighter brown ; in young birds the feathers of the back and wing coverts have rufous margins.

Bill, legs, and feet black ; iris brown.

Length 7 ; wing 3·15 ; tail 3·6 ; tarsus ·75 ; bill from gape ·68.

Distribution.—This species, divided into several geographical races, is found over the greater part of India, except on the west and north-west. The Ceylon form is probably a good sub-species, and has a peculiar distribution confined to the east and south-east of the Island. The western limit

of its main haunts runs from Tangalla to Haputale, then across the Uva hills to the park country on the east of the central range as far north as the glades round Polonnaruwa. It is found all over the Hambantota District, but does not appear to occur near the sea in the Eastern Province. Scattered colonies exist outside these limits in a few localities in the Galle and Matara Districts, also in Pussellawa and other places on the eastern portion of the central ranges. It is strange that a bird which is equally at home on the Uva hills and in the dry hot chenas east of Tangalla has not spread all over the drier districts of the Island.

Habits.—A familiar little bird round Bandarawela, &c., where it is known as the "drunken piper" from its human little whistle, which resembles an attempt at the first line of a tune. It has also a grating little call note, not unlike the "scrit" of the Paradise Flycatcher. It is extremely restless, constantly flitting from perch to perch and flirting its fan-shaped tail. It descends to the ground more frequently than most Flycatchers. The breeding season is from April to June. The nest is an exquisite little cup of fine grass coated with cobwebs and placed on the top of a bough or in a small fork. The two or three eggs are creamy-white, speckled generally in a fairly thick zone round the broad part of the egg, with grayish-brown. Average size ·67 by ·51.

Turdidæ.

The Thrush Family.

The *Turdidæ* as defined by Oates are a large Passerine group, in which the young are normally either mottled, or marked with a scaly pattern. Herein they agree with the Flycatchers; they differ, however, in having longer and more serviceable tarsi, and in lacking the horizontal hairs, which in the Flycatchers spring from the forehead and overlie the nostrils. I have followed E. C. Stuart Baker's classification by including in the family the *Brachypteryginæ*—A sub-family transferred from the place given them by Oates in the *Crateropodidæ*—and also by including the genera *Arrenga* and *Irena* in the sub-family *Turdinæ*, or true Thrushes.

The family includes four sub-families represented in Ceylon : the Chats—*Saxicolinæ;* the Redstarts and Robins—*Ruticillinæ* ; the Shortwings and Blue Chats—*Brachypteryginæ ;* and the Thrushes—*Turdinæ.* The above sub-families comprise a variety of forms, but the following points are held in common, besides those mentioned above ; the edges of both mandibles are smooth, or the upper mandible is simply notched ; the wing has ten primaries ; the nostrils are clear of the line of the forehead ; there is an autumn moult, frequently supplemented by a partial change in spring, caused by the shedding of the margins of the feathers ; there are usually twelve, very seldom fourteen, tail feathers. Many of the species are migratory.

The four sub-families may be divided thus :—

Saxicolinæ.—Habits like those of the Flycatchers, but more terrestrial. The insect food is captured by short sallies from a perch.

Ruticillinæ.—Insectivorous ; largely terrestrial.

Brachypteryginæ.—Insectivorous ; habits terrestrial and skulking.

Turdinæ.—Both terrestrial and arboreal ; larger in size than the other sub-families and more gregarious ; food partly of insects, partly of berries, &c.

Sub-family *Saxicolinæ.*

Genus **Pratincola.**

Chats.

The Chats are nearly related to the Flycatchers, and have the same habit of making short sallies, in search of insects, from a fixed perch, to which they return. Their prey, however, is generally captured on the ground and not on the wing. They have also a very characteristic manner of raising and depressing their tails and darting out their wings when on their perch. They are most strongly represented in Africa, but are also widely distributed in Europe, Central Asia, and India.

In the genus *Pratincola* the bill is fairly wide at the base and moderately curved; the rictal bristles are well developed; the wing is moderate in length and somewhat rounded; the tail is slightly rounded and shorter than the wing; the tarsus is smooth and moderate in length. The sexes are dissimilar. Only one species is found in Ceylon. The male is black and white, and may be distinguished from the little Black Robin by its white tail coverts.

Pratincola caprata atrata.

The Southern Pied Bush Chat.

Pratincola atrata (Oates, Vol. II., p. 60); *Pratincola bicolor* (Legge, p. 430).

Description.—Male: In the breeding season the whole plumage black, except for the tips of the rump feathers, the tail coverts both upper and lower, and a broad band on the wing-coverts, all of which are clear white; as the season wears on the black feathers become more or less fringed with rufous-brown.

Female: The feathers of the upper plumage, including the wings, dusky-brown with lighter edges, the wing coverts with broader light margins; rump and upper tail coverts pale rufous; tail almost black; chin and throat slightly streaky grayish-brown; breast, sides, and upper abdomen dull pale brown with dark streaks; lower abdomen unstreaked; under tail coverts pale rufous.

Young birds are fulvous brown mottled all over with dusky-brown; lower breast and abdomen pale fulvous; in males the white wing patch is assumed at a very early stage.

Bill, legs, and feet black; iris brown.

Length about 6; wing 3; tail 2·3; tarsus ·9; bill from gape ·75.

Distribution.—The Pied Bush Chat is found almost throughout the Indian Empire, and ranges from Persia to Java and the Philippines. The present sub-species occurs in South India and Ceylon, and unlike most southern forms, is distinguished by its larger size and more massive bill. In Ceylon

it is confined to elevations of over about 3,500 feet, and is almost entirely restricted to the Horton Plains, the Nuwara Eliya plateau, Uda Pussellawa, and the Uva hill basin.

Habits.—Fairly common in and round Nuwara Eliya and on the patanas and bare or rocky hillsides within its range. It usually occurs in pairs, and is not at all shy. The main habits are described in my remarks on the sub-family. The male has quite a pretty little warble. The breeding season is from April to June. The nest is a saucer-shaped pad of grass, roots, and fibres placed in a grassy ledge or a hole in a bank. There are probably three to four eggs of bluish-green with brownish-red markings. Average size (of South Indian eggs) ·77 by ·6.

Sub-family *Ruticillinæ*.

Bluethroats and Robins.

The *Ruticillinæ* connect the Chats with the true Thrushes. They are found mainly in Europe and Asia. Many of them are migratory, but only one migrant species penetrates as far south as Ceylon, and that merely as a rare straggler. Our three resident forms, however, are familiar birds. The members of this sub-family are mainly terrestrial; the tarsi are long; the feet are well adapted for running, and the insects on which they feed are picked up from the ground. Like the Chats, they have the habit of frequently cocking the tail and drooping the wings. In one genus—*Thamnobia*—the tarsus is scutellated in front; in the rest it is smooth. In all Ceylon species the rictal bristles are weak and the bill fairly slender; the wing is moderate in length and rounded, being somewhat sharper in *Cyanecula* than in the other genera; the tail varies greatly in length and shape. The sexes are dissimilar.

Key to Ceylon Ruticillinæ.

I.—No white on the tail, which is shorter than the wing.

(1) Length about 6; upper plumage mainly brown; tail brown and chestnut.

Cyanecula suecica suecica (Indian Bluethroat).

(2) Length about 6·3; upper plumage black in males, dusky-brown in females; tail black, lower tail coverts chestnut.
Thamnobia fulicata (Black Robin).

II.—Tail black and white.

(1) Length about 8; tail about 3·5; upper tail coverts black.
Copsychus saularis ceylonensis (Magpie Robin).

(2) Length about 11; tail about 6; rump and upper tail coverts white.
Cittocincla macrura macrura (Shama Robin).

Cyanecula suecica suecica.

The Indian Bluethroat.

Cyanecula suecica (Oates, Vol. II., p. 99; Legge, p. 443).

Description.—Male: Upper plumage, including wings, brown, the feathers of the head and neck with darker centres; chin and throat bright blue with a rufous patch in the centre of the throat, the blue area is bordered below by a band of black, and this band by another broader rufous band; lores black; a buff stripe from the nostrils over the eye to the ear coverts; cheeks and ear coverts buff mixed with black; remainder of lower parts dull white; central tail feathers brown, the others with the basal half chestnut and the end half blackish-brown.

Females: Whole of lower parts buffish white; a broad blackish gorget with brown spots across the breast. Immature males resemble females, only gradually assuming the blue and chestnut of full maturity, and birds are seldom met with in the full male plumage. In nestlings the upper parts are blackish streaked with buff, the feathers of the lower parts buff edged with black.

Bill black, the base flesh colour; iris brown; legs dusky flesh colour.

Length 5·9; wing 2·9; tail 2·3; tarsus 1·1; bill from gape ·75.

Distribution.—This species, of which there are several races, is found in summer in the far north from Western Europe to the Pacific Coast of Asia. It winters in warmer climates from North Africa to Southern China. With us it is an extremely rare north-east monsoon visitor. A few specimens were procured by Layard at Ambagamuwa, and Legge believes that he once saw it in the North-Western Province.

Habits.—May be looked for in gardens and open country.

Thamnobia fulicata.

The Black Robin.

Thamnobia fulicata (Oates, Vol. II., p. 115; Legge, p. 440).

Description.—Male: Whole body plumage glossy blue-black, except the lower abdomen and lower tail coverts, which are chestnut; wings and tail a less glossy black; a white patch on the lesser and median wing coverts; towards the moulting season the plumage loses some of its gloss and hue.

Female: Feathers of upper plumage dusky-brown with slightly brighter brown edges, most noticeable on the wing coverts; wing quills rather paler brown; upper tail coverts and tail black; lower parts dusky-brown with a slightly grayish tinge, the tips of the abdominal feathers and the lower tail coverts dull chestnut.

Young: Blackish-brown above, the wing coverts and quills with broad rufous edges; upper tail coverts and tail blackish; feathers of head and fore-neck tipped with rufescent gray; lower parts dark brown mottled with rufous; centre of abdomen and under tail coverts pale chestnut.

Bill, legs, and feet black; iris brown.

Length 6·3; wing 2·85; tail 2·5; tarsus 1; bill from gape ·7.

Distribution.—Abundant all over the low-country, more especially in the drier districts. It ascends the hills up to about 4,000 feet. It also occurs in the southern half of the Indian Peninsula.

Habits.—A very familiar bird, whether in town gardens, near villages, in chenas and low scrub jungle, or round tanks, and fields. It is as active and perky in all its movements, and as fearless of man as its namesake, the

English Robin. The note is a cheerful little chirp. The breeding season begins in March and lasts right on through the dry weather to September. The nest is a little loose structure of moss, hair, roots, or grass, placed in all sorts of cavities, from a hole in a bank, or an empty coconut shell lying on the ground, to any available niche in an outhouse or verandah. There are generally only two eggs, at times three. They vary a good deal, the ground colour ranging from dull white to greenish or brownish-white, thickly spotted with reddish-brown and at times dull purplish-gray. Average size of a large Ceylon series ·79 by ·59.

Copsychus saularis ceylonensis.

The Magpie Robin.

Copsychus saularis (Oates, Vol. II., p. 116; Legge, p. 433).

Description.—Male: Head, neck, breast, and upper plumage glossy blue-black; abdomen, sides of the body, and lower tail coverts white; wing coverts and quills black with a large white area formed by the lesser and median coverts, the outer webs of the innermost coverts and of the two innermost secondaries; the two central pairs of tail feathers black, the three outer pairs white, the remaining pair white, except for a black border on the inner web and at times a thin black edge on the outer web as well; wing lining white.

Females: The black of the wings, tail, and upper parts is rather rusty, the body feathers glossed with blue; chin, throat, and sides of neck dark gray; the white of the under parts not quite so clear as in the male; forehead, lores, and cheeks slightly mottled with gray.

In young birds the dark parts of the upper plumage are distinctly brown; the wing quills have rufous edges; the lesser coverts are more or less mottled with rufous; the throat and breast grayish-brown mottled with rufous.

Bill black; eyelids lead colour; iris hazel brown; legs and feet dark lead colour.

Length about 8; wing 3·8; tail 3·5; tarsus 1·15; bill from gape 1; females are slightly smaller.

Distribution.—This species is found almost throughout the Indian Empire. The Ceylonese form is given sub-specific

rank. It is common over the whole of the Island up to about 5,500 feet, except in the heart of the damp forests.

Habits.—As familiar and tame a bird as the last species. It is equally abundant in town gardens, village compounds, cultivated lands, scrub-jungle, and open forest. It feeds on the ground on insects, and is active on its feet. It has the habit of cocking its tail perpendicularly at the end of its run. The song is varied and full, and, especially during the breeding season, is poured out for long periods in the early morning and late evening. The breeding season is generally from March to August, but at times in the early part of the north-east monsoon. The nest is rather a rough structure of grass, root fibres, &c., placed in the hole of a tree, in any niche of a wall, or among the cadjans in the roof of an out-house or watch hut. There are usually three eggs, very seldom four. They are rather dumpy and slightly pointed. The ground colour is pale bluish-green, or light green, thickly sprinkled with various shades of sepia brown and occasionally bluish-gray. The markings tend to coalesce at the larger end, but vary considerably in distribution. Average size ·92 by ·69.

Cittocincla macrura macrura.

The Shama Robin.

Cittocincla macrura (Oates, Vol. II., p. 118 ; Legge, p. 437).

Description.—Male : Whole head and neck, back, wing coverts, and chest glossy blue-black ; rump and upper tail coverts white ; wing quills and primary coverts rusty-black ; four central tail feathers entirely black, the rest black at the base, white at the end ; abdomen, vent, and under tail coverts chestnut ; thighs white above, black at the knee. In females the black parts are more slaty-brown, and the chestnut of the lower parts pale rufous ; quills and wing coverts with narrow rufous edges.

Young birds vary ; in most the upper plumage is dark brown with some light chestnut spots ; the quills are edged with rufous ; the lower parts rusty-red mottled with brown on the throat and breast.

Bill black ; iris brown ; legs pale flesh colour.

Length about 11 ; wing 3·7 ; tail about 6 ; tarsus 1·1 ; bill from gape ·95.

Distribution.—Found throughout the greater part of the low-country forests, but less common in the west and south-west. It ascends the hills to about 3,500 feet. It occurs in Central and Southern India, the sub-Himalayan region from the Ganges eastward and in Assam and Burma.

Habits.—A shy bird, which spends most of its time in forest undergrowth and bamboo scrub. It feeds on insects, and is generally found in pairs. It is our finest songster ; the notes are lower and richer than those of the Magpie Robin. I have found eggs from February till June. The nest is made of dry leaves, grass, and twigs, and is placed in the hole of a tree or dead stump in the forest. The eggs are, as a rule, slightly smaller and more elongated at the narrow end than those of the Magpie Robin. The ground colour is pale grayish-white, at times with a slight green tinge, thickly and rather streakily freckled all over with umber brown. At times the markings are more pronounced at the larger end. Average size ·89 by ·64.

Sub-family *Brachypteryginæ*.

Genus **Larvivora.**

Blue Chats.

In the classification adopted by Oates, the *Brachypteryginæ* formed a sub-family of the *Crateropodidæ*, and, as he remarks, connect them with the *Turdidæ*. I have, however, followed Stuart Baker, in transferring the Ceylon species *Arrenga blighi* from this sub-family to the *Turdinæ*, and the sub-family itself, which now contains only one migratory Ceylon species, to its present position in the *Turdidæ*. The young appear to have discarded the normal mottled plumage characteristic of the family, but the affinities seem to be with the Thrushes and not with the Babblers. The Blue Chat in its general colouration is not unlike the Blue Fly-catchers of the genus *Cyornis*. It is, however, strictly

terrestrial in its habits, skulking in the undergrowth, and, as might be expected in a ground bird, has a long tarsus, whereas the Flycatchers are arboreal and have a weak, short tarsus.

The bill is short and slender; the nostrils are thin ovals, and not overhung with hairs; the rictal bristles are scanty; the wing is moderate in length and somewhat pointed; the tail short; the feet are delicate, the middle toe is much the longest. The sexes are dissimilar.

Larvivora brunnea.

The Indian Blue Chat.

Larvivora brunnea (Oates, Vol. I., p. 182; Legge, p. 446).

Description.—Male: Upper plumage, wing coverts, and tail dull blue; lores, cheeks, ear coverts, and a band down the sides of the neck dull black; a white line over the eye to the nape; wings dusky-brown, the outer webs bluish; in some specimens the point of the chin and a narrow line on the cheeks white; throat, breast, and sides of body bright chestnut paling into white on the abdomen, vent, and lower tail coverts.

Female: Head, upper plumage, and lesser wing coverts dark olive-brown, tinged with russet on the tail coverts; greater wing coverts and quills brown, tinged with rufous on the outer webs, the coverts also with rufous tips; tail brown washed with russet; forehead, lores, and sides of head rufous with brown mottlings; centre of chin and throat, abdomen, and under tail coverts pure white; sides of chin and throat and the breast rusty fulvous, each feather with a brown margin; sides of body unmarked fulvous.

Young birds resemble the adult female.

Bill black above, paler beneath; iris dark brown; legs and feet flesh colour.

Length 5·5; wing 3; tail 2; tarsus 1·05; bill from gape ·72.

Distribution.—This Chat is with us a north-east monsoon migrant. The flight is weak, and it appears to cross by the

shortest sea-route from South India to the north of the Island in October. It then makes its way to the central hills. Many of our visitors are yearling birds. The species occurs over the greater part of India, being a resident on many of the hill ranges and visiting the plains in winter.

Habits.—A skulking bird, which keeps almost entirely to the undergrowth in forest, appearing for short periods at the edge of the jungle, or by the side of jungle paths, and searching actively on the ground for the insects on which it feeds.

Sub-family *Turdinæ*.

Thrushes.

The true Thrushes are larger and, as a rule, more gregarious than the other sub-families of the *Turdidæ*. Their food is not wholly insectivorous, and berries form a considerable part of their diet. The eight species found in Ceylon are all of fairly stout build and of medium size from 8 to 10½ inches in length. None of them are very familiar, as they are all local in their distribution; most of them are rare, and all, save one or two, are met with only in the hills. Four species are peculiar to this Island, while the others are, with one possible exception, rare migrants. The first six species on the list are structurally much alike, and there has been considerable diversity of opinion in dividing them into genera. The wing is moderate, and generally somewhat pointed; the tail is never of great length, and in *Geocichla* and *Oreocincla* is distinctly short; the rictal bristles are feeble; the tarsus is moderately long, stout, and serviceable. The birds spend a good deal of their time on the ground. There is one moult a year, in the autumn, but in many species there is a partial change of plumage in spring, due to the dropping off of the margins of the feathers. In the young the lower plumage is more or less barred or spotted, and in some species this characteristic is maintained in the adults. As regards the last two species, *Arrenga blighi* and *Irena puella*, I have followed Stuart Baker in transferring them from the *Crateropodidæ* to the *Turdinæ*, although the young are no longer spotted. *Arrenga blighi* is Thrush-like in its general

build and appearance, but the wing is more blunt than in the rest of the sub-family. The nest and eggs also, as far as is known, are Thrush-like. *Irena puella* is more aberrant, and has distinct affinities with the Bulbuls. As in the Bulbuls, there are a few long hairs springing from the nape. The wing is rather pointed ; the rictal bristles are well developed, and the bill more arched than in other Thrushes. The tarsus is short, and the habits arboreal. The nest and eggs are of a distinct type, unlike either those of the Thrushes or Bulbuls.

Key to Ceylon Turdinæ.

A.—Only a slight difference between the sexes ; plumage almost uniform blackish ; lower tail coverts same colour as lower parts.

Merula kinnisi (Ceylon Blackbird).

B.—Sexes unlike ; plumage more or less pied ; under tail coverts unmixed white. Genus *Geocichla.*

(1) No chestnut in plumage ; some white in tail ; males : black and white ; females : olive-brown and buffy-white and with lower plumage barred, not pied.

G. Wardi (Pied Ground Thrush).

(2) Head and most of lower plumage chestnut ; male : back and scapulars bluish-gray ; female : back and scapulars greenish-brown with yellowish edges.

G. citrina citrina (Orange-headed Ground Thrush).

C.—Sexes unlike ; upper plumage blue or brown suffused with blue ; lower tail coverts not white ; males : lower parts and tail coverts same hue as rest of plumage ; females : lower parts fulvous with subterminal black bars, lower tail coverts fulvous barred with black.

Petrophila solitaria pandoo (Western Blue Rock Thrush).

D.—Sexes alike ; lower plumage barred or spotted even in adults. Genus *Oreocincla*.

(1) Bill large and coarse ; upper plumage with darker margins ; lower plumage tawny-buff with black crescent-shaped bars.
Oreocincla imbricata (Ceylon Thrush).

(2) Bill more moderate ; upper body plumage and tail unmarked brown ; lower plumage white with black spots.
O. Spiloptera (Spotted-wing Thrush).

E.—A slight difference in sexes ; plumage mainly dark blue or brown suffused with blue ; a bright blue patch on the " elbow " of the wing.
Arrenga blighi (Bligh's Whistling Thrush).

F.—Sexes markedly different ; tarsus noticeably shorter than in other genera ; plumage pied ; males vivid blue and black ; females brownish-blue and brown.
Irena puella (Fairy Bluebird).

Merula kinnisi.

The Ceylon Blackbird.

Merula kinnisi (Oates, Vol. II., p. 124) ; *Turdus kinnisi* (Legge, p. 449).

Description.—Male : Upper plumage, including wings and tail, slaty-black, each feather with slightly paler bluish-gray margins, most noticeable on the wings and wing coverts ; lower plumage slightly rusty-black with paler margins, the abdomen tinged with grayish.

Female : Upper body plumage dark bluish-gray, with blackish markings towards the tips ; wing quills and tail slightly browner than in the male ; under parts tinged with earthy-brown ; in some, probably not fully adult specimens, the feathers of the abdomen have light shaft-streaks.

In young birds the head and hind-neck are brownish, and the upper plumage has a distinct bluish gloss ; the lower plumage is dull brown, with buff shaft-streaks and dark tips.

Bill orange-yellow ; iris pale brown ; legs and feet pale yellow ; in young birds the bill and legs are brownish.

Length 9·5; wing 4·4; tail 3·6; tarsus 1·25; bill from gape 1·2.

Distribution.—Peculiar to Ceylon, and confined to the hills above 2,500 or 3,000 feet. Allied species occur on the hill ranges of Southern India.

Habits.—Rather a shy bird, passing most of its time in the jungle undergrowth, or on the edges of cover. It is not uncommon round Nuwara Eliya, and may be seen in the more secluded parts of the gardens in that town, or on up-country estates. Out of the breeding season it often collects in fairly large parties to feed on tree fruits in the jungle. It is a fair songster, and is most vocal in the early mornings and towards sunset. The breeding season is from April to June. The nest is a somewhat massive cup of grass, moss, and roots, strengthened with a few twigs and lined with fine roots. It is usually placed in a low fork of a tree, but may be found on stumps, niches in tree trunks, outhouses, &c. There are generally four eggs. The ground colour is pale green, blotched fairly evenly with reddish-brown and umber, and with some smaller underlying spots of reddish-gray. Average size 1·05 by ·82.

Geocichla wardi.

The Pied Ground Thrush.

Geocichla wardi (Oates, Vol. II., p. 137); *Turdus wardi* (Legge, p. 453).

Description.—Adult male: Whole head, neck, breast, upper plumage, wings, and tail black; a broad white stripe from the bill over the eye to the nape; wing coverts and quills with more or less conspicuous white tips, except the outer primaries and primary coverts, in which a portion of the outer web is white; rump and upper tail coverts with crescent-shaped white tips; the two outer pairs of tail feathers all white, except for a patch of black on the outer webs, the amount of white decreases on the inner feathers, the central pair being almost wholly black; abdomen, vent, and under tail coverts white; sides of body and axillaries white, each feather with a broad irregular crescent of black; wing-lining black tipped with white.

Females: Head, upper plumage, wings, and tail olive-brown, the wing coverts and inner quills tipped with buff, the outer webs of the primaries with pale brown edges; a few white tips on the rump and upper tail coverts; outer tail feathers with a patch of white on the tip; a buff streak from the bill over the eye to the nape; sides of head and throat mixed buff and dark brown; chin almost unmarked white; upper breast pale buff with broad, dark brown margins; lower breast and flanks white with crescent-shaped blackish bars; centre of abdomen, vent, and lower tail coverts white.

Immature males resemble females, but are of a richer brown above, while the breast feathers are olive-brown with drop-shaped white centres.

Bill yellow, the base of the upper mandible dusky; iris brown; legs and feet pale brownish-yellow.

Dimensions a little variable; length about 8·5; wing 4·5; tail 3·2; tarsus 1; bill from gape 1·15.

Distribution.—Breeds on the Himalayas and appears to winter chiefly in the hill ranges of Southern India and Ceylon. It has been seen on passage in various parts of the Indian Peninsula. In Ceylon it is a north-east monsoon migrant to the hills at elevations of over 2,500 feet. In some localities it appears to be irregular in its visits, in others more constant.

Habits.—A shy bird, which keeps mainly to thick cover on the outskirts of forest, patana woods, &c. It occasionally leaves its shelter, and may be seen on the lawns in up-country gardens. At times it collects in small scattered flocks to feed on fruit, such as guavas and wild figs, being partly frugivorous.

Geocichla citrina citrina.

The Orange-headed Ground Thrush.

Geocichla citrina (Oates, Vol. II., p. 140; Legge, p. 457).

Description.—Male: Whole head, neck, and lower parts to vent orange-chestnut, darker on the crown, and paler on the lower parts; vent, thighs, and lower tail coverts pure white; feathers of back, scapulars, rump, upper tail coverts, and lesser wing coverts bluish-gray with paler edges; the median wing coverts with broad white tips; outer coverts and quills dark brown with bluish-gray outer webs; the

central tail feathers and the outer webs of the rest bluish-gray, the remainder of the tail dark brown, the whole with indistinct cross-rays; axillaries white with pale gray tips; wing-lining gray tipped with white.

In females the chestnut parts are paler, and the gray of the upper plumage is washed with olive-green; back and scapulars greenish-brown with yellowish margins.

Bill blackish-brown, the gape and base of lower mandible flesh-colour; iris dark brown; legs and feet fleshy-pink.

Length 8·5; wing 4·6; tail 3; tarsus 1·3; bill from gape 1·1.

Distribution.—Breeds throughout a large part of the Himalayas. In winter it occurs sparingly in the plains of India proper, but is more common in Assam and Burma. In Southern Burma it appears to be a partial resident. In Ceylon it is one of our rarest migrants, single specimens having been recorded from the Jaffna and Hambantota Districts and the Eastern Province.

Habits.—May be looked for during the north-east monsoon by river banks, or the sides of paths in heavy forests. It keeps mainly to the ground, turning over dead leaves in damp spots in search of insects.

Petrophila solitaria pandoo.

The Western Blue Rock Thrush.

Petrophila cyanus (Oates, Vol. II., p. 146); *Monticola cyana;* Legge, p. 460).

Description.—Male: In winter the whole body plumage is blue, the colour brightest on the eye-brow, throat, and ear coverts; most of the feathers have narrow whitish fringes and dull brown sub-terminal bars; lores and round the eye blackish; wings and tail dark brown, the quills edged with blue and tipped with white. At the end of winter the feathers nearly all lose their light fringes and dark bars, so that the body plumage is almost uniform blue.

Female: Upper plumage brown suffused with dull blue; lower plumage fulvous with sub-terminal black bars; wing-lining and under tail coverts barred with black. In summer the fringes and bars largely disappear as in the male.

Young birds resemble females, but have broader white fringes.

Bill, legs, and feet black ; iris hazel.

Length about 9·5 ; wing 4·9 ; tail 3·4 ; tarsus 1·2 ; bill from gape 1·2.

Distribution.—The Blue Rock Thrush breeds over a wide range from Southern Europe to China and winters in Northern Africa and Southern Asia. It varies considerably, the present sub-species, which is the Western form, visits almost the whole of the Indian Empire in winter. In Ceylon it is only an occasional visitor, which has been recorded from a few localities in the hills.

Habits.—A shy restless bird, which may be looked for in bare rocky spots, especially under high precipices. Birds which visit us appear to frequent the same locality during the whole of their stay.

Oreocincla imbricata.

The Ceylon Thrush.

Oreocincla imbricata (Oates, Vol. II., p. 154 ; Legge, p. 455).

Description.—Head and upper body plumage olive-brown, slightly paler on the rump and upper tail coverts, the feathers with crescent-shaped black tips giving the plumage a scaly appearance ; feathers of the head and neck each with a pale shaft-streak, which adjoining the black tip becomes a tawny patch, this is more noticeable in some specimens than in others ; wings dark brown, the secondary coverts tipped and narrowly edged on the outer web with tawny-buff, the primary coverts black on the inner web and tip, the outer web washed with tawny-buff, the quills more faintly washed on the outer web with the same hue ; tail olive-brown, the three feathers next the outermost on each side blackish with paler tips ; face and lower parts rich tawny-buff, the chin and abdomen paler, each feather with a bold black crescent-shaped tip, these tips become almost obsolete on the chin, centre of abdomen, and lower tail coverts ; axillaries white at the base, black at the tip ; wing-lining black tipped with white.

Bill blackish-brown, paler at base of lower mandible ; iris brown ; legs and feet fleshy-brown, at times with a bluish tinge.

Length about 9·5 ; wing 4·9 ; tail 3 ; tarsus 1·1 ; bill from gape 1·4.

Distribution.—Peculiar to Ceylon and confined to the hills over 3,000 feet. Closely allied species are found on the Nilgiris, Eastern Himalayas, and Burma.

Habits.—An uncommon and shy bird, which may be found in open but secluded spots in wooded country, or in thick scrub. It keeps almost wholly to the ground, turning over fallen leaves for the insects on which it feeds. Nothing is known of the nidification.

Oreocincla spiloptera.

The Spotted-wing Thrush.

Oreocincla spiloptera (Oates, Vol. II., p. 155); *Turdus spiloptera* (Legge, p. 451).

Description.—Upper plumage and lesser wing coverts rich olive-brown with a tinge of russet ; median and greater wing coverts blackish-brown with a clear white spot on the tip ; wing quills dark brown, the outer webs with paler edges ; tail rusty olive-brown with very faint cross-rays ; lores whitish ; ear coverts and cheeks mixed black and white ; lower parts white, the sides of the breast and body tinged with gray ; the feathers of the fore-neck, breast, and upper half of the abdomen tipped with more or less fan-shaped black spots ; axillaries white tipped with dark brown ; wing-lining dark brown tipped with white.

In birds from the wet zone the upper plumage is darker than in specimens from drier districts.

In nestlings the feathers of the upper plumage have pale shaft-streaks, while the spots on the wing coverts and the ground colour of the lower parts are buff.

Bill blackish, paler near the gape ; iris brown ; eye-lid lead-gray ; legs and feet dusky bluish-gray, or fleshy-gray.

Length about 8·4 ; wing 4 ; tail 3·1 ; tarsus 1·4 ; bill from gape 1·1.

Distribution.—Peculiar to Ceylon. Found in the hills up to about 4,000 feet and in the forests at their base, extending almost to the sea in the west and south-west. In the northern forest tract it is rarer, but has been obtained as far north as Trincomalee.

Habits.—A shy bird, which may be found in damp jungle, bamboo scrub, and forest undergrowth. It spends most of its time on the ground hunting for insects. The male has a pretty whistle, and sings from a perch on a low bough, chiefly in the morning and evening. Both sexes have a weak little note uttered while searching for food. The breeding season extends from January to about May. The nest is placed either in the fork of a sapling a few feet from the ground, or among the roots of a tree growing on a bank or little eminence. It is a loose-looking, though compactly put together structure of small twigs, roots, moss, and grass, lined with finer materials of the same sort, the egg cavity being a deep cup. There are two or three eggs, in shape regular ovals. The ground colour is pale bluish-green, scattered over with markings of light reddish-brown, or light red and reddish-gray. The marks tend to coalesce at the larger end. Average size 1·12 by ·75.

ARRENGA BLIGHI.

The Ceylon Whistling Thrush.

Arrenga blighi (Oates, Vol. I., p. 183); *Myiophoneus blighi* Legge, p. 463).

Description.—Male: Head and neck dull black; feathers of back, scapulars and breast dark blue with black bases; a patch of bright blue on the least wing coverts and the point of the wing; remainder of wing and the tail brownish-black, the wing quills with narrow bluish edges; rump and upper tail coverts black tinged with chocolate brown; abdomen, vent, and under tail coverts dull brown.

According to Legge, females resemble males, but have a lighter and brighter wing spot.

Immature birds are largely dark brown above, with traces of the blue wing spot, and chocolate brown on the whole of the lower parts, the feathers of the forehead, throat, and breast with lighter centres.

Bill, legs, and feet black ; iris brown.

Length about 8·25 ; wing 4·3 ; tail 3·3 ; tarsus 1·4 ; bill from gape 1·25.

Distribution.—Peculiar to the Island and one of our rarest residents. It is confined to the hill country at elevations of over 3,000 feet.

Habits.—This species keeps to the neighbourhood of mountain streams running through forest-clad gorges. It hides in the shade of the forest, now and again showing itself on the rocks in the stream bed. The cry, according to Legge, is a long-drawn, plaintive, though loud, whistling note. Its diet appears to be mainly insectivorous. Mr. E. Green discovered what he believed to be the nest of this species on March 1.* " It was placed on a sheltered ledge of rock by the side of a waterfall and hidden by surrounding ferns. It was a very compact, solid structure of moss and fern roots, the top forming a level platform, in which a small and rather deep cavity was sunk for the eggs. The platform exceeded in area the hollow space, and when first found the fresh body of a small fish was lying upon it, its head having apparently just been devoured. In the hollow of the nest was a single egg, bluntly oval, with a smaller and larger extremity ; the colour dull greenish-white stained with pale reddish at the end. I was unable to get a sight of the birds, though I heard them in the bushes close by, uttering the complaining note common to many thrushes. I had on former occasions seen specimens of what I believe to be *M. blighi* frequenting this stream."

Irena puella.

The Fairy Bluebird.

Irena puella (Oates, Vol. I., p. 240 ; Legge, p. 466).

Description.—Male : The whole of the upper parts, lesser wing coverts, and under tail coverts glistening ultramarine blue shot with lilac ; sides of head and lower parts deep black ; greater wing coverts, wing quills, and tail black ; some of the coverts have blue tips and the central tail feathers are washed with blue.

* *Vide* " Taprobanian," Part II., Vol. III., 1887, p. 27.

Females: Upper plumage, lesser wing coverts, and lower tail coverts brownish-blue with brighter edges; tail brown, the central feathers and outer webs of the others, except the outermost pair, the same blue as the back; wing coverts and quills dark brown, the greater coverts and innermost quills tinged with blue on the outer webs; sides of head and lower plumage brownish-blue.

Immature birds resemble females, the change into adult male plumage is gradual.

Bill, legs, and feet black, iris crimson.

Length 10·5; wing 5; tail 4; tarsus ·80; bill from gape 1·15.

Distribution.—Very rare and probably a casual visitor. It has been obtained near Kandy and in the Ratnapura District. In India it occurs on the Malabar Coast, on the lower slopes of the Eastern Himalayas, the Assam hills, Burma, the Andamans, and Nicobars.

Habits.—May be looked for in tall forest. It feeds entirely on fruit, and is generally found in small parties or pairs on the top of the higher trees. In India the breeding season is from February to April. The nest is a shallow cup of moss or twigs placed in a sapling or small tree. Two eggs are laid. The colour is pale green, streaked and blotched with pale, dull or reddish-brown. Average size (of Indian eggs) 1·14 by ·77.

Family *Ploceidæ*.

Weaver Birds and Munias.

With the *Ploceidæ* we come to the first of two families in which the bill is strong and conical, while the nostrils are pierced within, or only just outside the line of the forehead, and lie closer to the ridge than to the cutting edge of the bill. There is never more than the trace of a notch in the upper mandible. The primaries are ten in number, but the first is quite small. Africa is the strong-hold of the family, but it is also well represented in South-Eastern Asia and Australia. There are two sub-family groups.

(*a*) *Ploceinæ*, or Weaver Birds, in which the first primary, though small, is quite easily seen, and which have a partial spring moult as well as the usual moult in autumn.

(*b*) *Viduinæ*, or Munias, in which the first primary is exceedingly small, and which have no spring moult.

Sub-family *Ploceinæ*.

Genus **Ploceus.**

Weaver Birds.

The Weaver Birds comprise two Ceylon species of about the size of the Sparrow, to which in build they bear a considerable resemblance. They feed largely on grain and are very gregarious. They always breed in colonies and take their name from the neatly woven flask-shaped nests which they construct.

In addition to the autumn moult, there is a partial moult in spring, after which the males assume a bright yellow crown. The bill is stout and conical ; the wings are of moderate length and rather rounded, the first primary though small is plainly visible and reaches just beyond the primary coverts ; the tail of 12 feathers is short and rounded ; the tarsus is strong, but of moderate length, the claws are fairly long and curved.

Key to Ceylon Ploceinæ.

1.—Breast plain or not conspicuously streaked.
Ploceus passerinus baya (Common Weaver Bird).

2.—Breast conspicuously streaked.
P. manyar manyar (Striated Weaver Bird).

Ploceus passerinus baya.

The Common Weaver Bird.

Ploceus baya (Oates, Vol. II., p. 175) ; *Ploceus philippinus* (Legge, p. 641).

Description.—Male in breeding plumage : Forehead, crown, and nape canary-yellow, blending on the nape into the dark brown of the hind-neck ; feathers of the back and scapulars almost black with broad yellow margins ; lower back and rump unstreaked brown ; upper tail coverts with pale tips ; wing coverts, quills, and tail feathers dark brown with pale fulvous edges ; lores, face, ear coverts, and throat dark brown ; breast bright yellow ; rest of lower parts fulvous, paling into whitish on the vent and lower tail coverts.

Males in off season and females all the year round: The yellow is absent, the upper plumage being dark brown with fulvous margins; a fulvous streak over the eye; sides of head pale fulvous brown; lower parts pale fulvous, darker on the breast and flanks, and almost white on the abdomen, vent, and lower tail coverts; the sides of the breast and the flanks at times have narrow brown streaks; wings and tail as in breeding male.

Bill, of male in breeding season, dark horny-brown, lighter at the gape and base of the lower mandible, otherwise yellowish horn-colour; iris brown; legs and feet flesh-colour.

Length 5·85; wing 2·85; tail 1·9; tarsus ·8; bill from gape ·65.

Distribution.—*P. passerinus* occurs over the whole of the Indian Empire, and ranges south-east to Java and Sumatra. The present sub-species is found over the greater part of India proper. In Ceylon it is met with throughout the low-country, but is perhaps commoner in the maritime districts than inland. It is local and occasionally shifts its quarters.

Habits.—Occurs in flocks on the borders of open land and scrub jungle, generally not far from water, and frequently by the side of a paddy field or tank. The presence of a flock can always be told by the incessant chattering and shrill whistling made by the birds. They have a strong rapid flight and feed voraciously on paddy and other grain The breeding season appears to be intermittent, and extends over a great part of the year, probably varying in different localities. I have taken eggs in February, June, August, and November. The birds breed in colonies, the long flask-like nest, familiar to most people, being hung from the fronds of a palm or the spreading branches of a tree. The construction shows great skill. The upper part of the nest is cone-shaped and hangs from a single point. When this cone is woven to a sufficient length, the birds add a strong transverse loop, like an inverted basket handle, a little to one side of the centre. The bottom of the egg chamber is then worked in on one side of the loop, while on the other the weaving is carried downwards to form the long entrance funnel, which

is added to by the male long after the hen has begun to sit. There are generally two, but not infrequently three, and very occasionally four eggs. They are pure white ovals slightly pointed at the small end. Average size ·79 by ·57.

Ploceus manyar manyar.

The Striated Weaver Bird.

Ploceus manyar (Oates, Vol. II., p. 179; Legge, p. 646).

Description.—Male in breeding plumage. Top of head rich yellow; remainder of upper plumage, including wings and tail, deep blackish-brown, with tawny margins to the feathers; cheeks, ear coverts, sides of neck, and throat brownish-black; chest and flanks tawny-brown with blackish shaft-stripes, which are broadest on the chest; centre of abdomen, vent, and under tail coverts whitish. Both the amount of striation and the depth of colour on the lower parts vary.

Males in off season and females at all times. Plumage of head and upper parts blackish-brown with tawny edges; a light stripe over the eye; the lower part of the cheeks and throat yellowish-white; breast and flanks striated as in the breeding male.

Bill, in breeding males, bluish-black, paler at the gape, in females and non-breeding males yellowish horn-colour; iris brown; legs flesh-colour.

Length 5·75; wing 2·75; tail 1·8; tarsus ·75; bill from gape ·65.

Distribution.—The striated Weaver Bird is found throughout the Indian Empire, and extends south-east to Java. It is divided into several sub-species. Its occurrence in Ceylon is distinctly local. It is abundant among the reed beds of the tanks and swamps of the Tangalla district, and I have found colonies in similar reed beds at one or two tanks in the Puttalam District. It probably occurs in various other suitable localities in the low-country.

Habits.—In Ceylon this species confines itself to the vicinity of reed beds in swamps and tanks. Like the last species, it

occurs in flocks, which can be heard at some distance. It appears to feed on insects as well as on grass seeds. The breeding season is about February and March, and again in June. The nest is constructed like that of the last species, but the top is almost square, not tapering, being hung from the points of several bulrush leaves gathered together; the funnel, too, is shorter. The eggs resemble those of the Common Weaver Bird, and are two or three in number. Average size ·76 by ·58.

Sub-family *Viduinæ*.

Munias.

The *Viduinæ* are a fairly numerous group of small finch-like birds, the largest of which seldom exceed 5 inches in length. They differ from the Weaver Birds in having an exceedingly minute first primary, and by not undergoing any change of plumage in spring. They are all more or less gregarious, except in the breeding season, and all build large globular nests of grass, often using fine grass stems with the flower heads still attached. The entrance is generally a round opening at one side of the ball. The eggs are invariably pure white, and the clutches are large, frequently consisting of six eggs or even more. Munias feed on grain and small grass seeds. Five species are found wild in Ceylon. One of them belongs to the genus *Munia*, in which the tail is short and round, while the middle pair of feathers are narrow and pointed. The plumage in this genus is mainly black and chestnut. The other species are all included in the genus *Uroloncha*, in which the tail is longer, while the outer feathers are considerably shorter than those in the centre.

None of the Munias are known to migrate, but as many species are frequently kept as cage birds, several exotic forms from time to time occur as escapes. Three such species have been recorded in the Island :—

(1) *Munia oryzivora* (The Java Sparrow).—This species has the head black with white cheeks and ear coverts; the rump and tail are also black; the remainder of the upper

parts, with the wings, neck, and breast, are bluish-gray; the abdomen, sides, and thighs are vinous, and the under tail coverts white.

This is a native of the Malay Peninsula and Archipelago, and is a familiar cage bird. It appears to be acclimatized near Madras, and in Legge's time it seems to have flourished temporarily round Colombo; it may still be seen, occasionally, on the Galle Face (*vide* Legge, p. 646).

(2) *Munia atricapilla* (The Chestnut-bellied Munia).—This species resembles *M. malacca*, but the lower breast and sides of the body are chestnut, not white. Its natural habitat is in Northern India, Assam, and Burma. Its occurrence has been recorded by Layard at Galle and by Legge in Colombo (*vide* Legge under *M. rubronigra*, p. 652).

(3) *Sporæginthus amandava* (The Indian Red Munia).—This bird belongs to a genus in which the middle tail feathers are broad and rounded, and the plumage of the two sexes differs. In the male the head, neck, breast, and upper parts are crimson; the rump, upper tail coverts, and part of the lower plumage are spotted with white; the wings are brown with white spots; the abdomen, vent, and tail largely black.

In the female the upper plumage and wings are mainly brown; the rump and upper tail coverts washed with crimson; the lower plumage is brownish tinged with fulvous yellow on the abdomen.

It occurs all over India, also in Siam, Cochin-China, and parts of Malaya. The only Ceylon records are by Legge (*vide* Legge, p. 662, under *Estrelda amandava*). He found a small flock on the outskirts of Colombo in 1870, and again one or two birds at Galle in 1872. In both cases the occurrence in the vicinity of a large town is suspicious, but the birds may possibly have been storm-driven from India.

Key to Ceylon Viduinæ.

A.—Tail rounded and short; head black, contrasting with the colour of the back. Genus *Munia*.

(1) Lower breast and sides of body white.
M. malacca (Black-headed Munia).

B.—Tail longer and more pointed ; crown and nape much the same colour as back. Genus *Uroloncha*.

(*a*) Some white on rump or upper tail coverts.

(1) Rump white ; throat and breast black.

U. striata (White-backed Munia).

(2) Upper tail coverts and whole of lower parts white.

U. malabarica (White-throated Munia).

(*b*) No white on rump or tail coverts ; lower parts chequered.

(1) Chin and throat blackish ; chequering includes the whole abdomen.

U. kelaarti (Ceylon Munia).

(2) Chin and throat chestnut ; centre of abdomen not chequered.

U. punctulata (Spotted Munia).

Munia malacca.

The Black-headed Munia.

Munia malacca (Oates, Vol. II., p. 182 ; Legge, p. 652).

Description.—Whole head, neck, upper breast, the middle of the abdomen, vent, thighs, and under tail coverts deep black ; rest of lower plumage white ; back, scapulars, and wing coverts chestnut ; wing quills brown edged with chestnut ; upper tail coverts shining maroon ; tail feathers brown edged with glistening chestnut, which at times approaches the maroon hue of the tail coverts. In young birds the upper plumage, wings, and tail are rufous-brown ; the under plumage pale buff. The adult plumage is acquired gradually by moult.

Bill pale lavender ; iris dark brown ; legs and feet lead blue.

Length 5 ; wing 2·2 ; tail 1·55 ; tarsus ·65 ; bill from gape ·45.

Distribution.—Rather local, and found chiefly in the east and south-east of the Island ; in the low-country frequenting the long grass of swamps, in the hills the long mana grass of the patanas, and further east the grassy glades of the park country. In other parts of the country it appears to be local and scarce. It occurs over the southern half of India.

Habits.—As noted above, this Munia is found among long grass. It generally occurs in small parties, or at times larger flocks, and feeds on grass seeds, often doing some damage to crops. The breeding season appears to be from March to August in the low-country, and about May in the hills. The nest is of the usual type described in my remarks on the sub-family. It is generally placed in a tuft of long grass or fern, occasionally in a low bush. There are four to six pure white eggs. The shape is a slightly pointed oval. Average size ·66 by ·46.

Uroloncha striata.

The White-backed Munia.

Uroloncha striata (Oates, Vol. II., p. 185); *Munia striata* (Legge, p. 660).

Description.—Forehead and crown blackish with indistinct white shafts; upper plumage, ear coverts, and sides of neck dark brown, deepening on the tail coverts and wing coverts into blackish, each feather with a white shaft; a broad white band across the lower back and rump; wing quills blackish-brown; tail almost black; face, chin, throat, fore-neck, and breast deep black; abdomen and sides of body white; vent, thighs, and under tail coverts blackish.

Young birds are more rufous-brown above and the throat and breast are brown with paler shafts and margins.

Bill, upper mandible blackish; lower bluish; iris reddish-brown; legs and feet bluish lead-colour.

Length 4·5; wing 2; tail 1·75; tarsus ·55; bill from gape ·4.

Distribution.—Common over almost all the low-country. It ascends the hills up to about 2,500 feet; on the Uva patanas it is found up to about 4,000 feet. In India it occurs south of a line drawn from about Bombay to South-west Bengal.

Habits.—Not so gregarious as some species. It occurs in small parties, and frequents waste scrubby land, clearings in the jungle, patches of grass in forests, &c. It visits paddy fields when the grain is in ear, and also levies considerable toll on kurakkan chenas. It breeds intermittently, chiefly during

the north-east monsoon, but occasionally as late as August. The nest is a loose ball of grass of the usual type, placed in a bush or the branches of a low tree from 3 to 10 feet from the ground. The situation chosen is generally rather a solitary spot, such as the edge of the forest at the head of a tank, or by a grassy roadside in the jungle. There are 4 to 6 eggs, pure white ovals, occasionally rather pointed. Average size ·60 by ·43.

Uroloncha kelaarti.

The Ceylon Munia.

Uroloncha kelaarti (Oates, Vol. II., p. 187; *Munia kelaarti* (Legge, p. 650).

Description.—Upper plumage chocolate-brown with pale shafts, the crown rather darker; rump and upper tail coverts almost black with white cross-shaped spots, the longer tail coverts with shining yellow tips; wing quills blackish-brown; tail almost black; sides of neck and of breast pinkish-brown; cheeks, lores, chin, throat, and fore-neck brownish-black; lower plumage from breast irregularly chequered white and black.

Young birds are dark brown above; they lack the pale shafts and the white marks on the rump; the whole of the lower parts, including the throat and fore-neck, are mingled brown and pale buff.

Bill blackish, base of lower mandible bluish; iris sepia-brown; legs and feet lead-colour, at times with a greenish tinge.

Length 4·7; wing 2·1; tail 1·7; tarsus ·55; bill from gape ·45.

Distribution.—Peculiar to Ceylon and confined to the hills, rarely descending as low as 2,000 feet. It is commonest on the central ranges, from the Peak to the Nuwara Eliya plateau.

Habits.—Less gregarious than most Munias, only collecting in flocks to roost. The flight, too, is more rapid. It is found deep in hill forests as well as in gardens or on estates. Like the other species it feeds on seeds, and like the sparrow it will hunt for food on dunghills, rubbish heaps, or roadsides. The

breeding season is from May to December. It frequently places its nest among the bushy creepers growing on the walls and verandahs of up-country bungalows, but it also builds in forest trees or bushes. The nest is of the usual globular type. The four or five eggs are slightly pointed ovals of pure white, and measure about ·61 by ·45.

Urolоncha malabarica.

The White-throated Munia.

Uroloncha malabarica (Oates, Vol. II., p. 188); *Munia malabarica* (Legge, p. 662).

Description.—Upper plumage, wing coverts, and inner quills pale earth-brown, darker on the crown; primary quills rather darker, the outer webs almost black; upper tail coverts white, the outer webs of the outside coverts black; tail blackish; sides of head and all the lower parts pale buffy-white, the lower flanks with a rusty tinge.

Bill, upper mandible partly black, partly horn-colour, lower mandible black; iris brown; legs and feet mauve or lilac.

Length 4·75; wing 2·1; tail 2; tarsus ·55; bill from gape ·4.

Distribution.—In Ceylon this Munia is found only in the dry maritime districts of the north and south-east. It is, however, widely distributed over the whole of India proper and ranges into Afghanistan.

Habits.—Found in dry sandy pastures round the lagoons of the north and south-east coasts, in dry paddy fields, &c. It goes about in flocks frequently in company with the Finch Lark *P. grisea*. It feeds entirely on the ground, mainly on small grass seeds, but occasionally visits fields of ripening paddy. The breeding season is from December to March. The nest is generally the usual globular mass of grass, with the opening at one side, but at times it is only partially domed, and in some cases the dome is altogether wanting.

The average clutch is probably from four to six eggs, but in India as many as fifteen have been found in one nest, probably the product of several birds. They are rather broad, glossless white ovals. Average size ·62 by ·45.

Uroloncha punctulata.

The Spotted Munia.

Uroloncha punctulata (Oates, Vol. II., p. 189); *Munia punctulata* (Legge, p. 656).

Description.—Upper plumage dull chocolate-brown with paler shafts; rump darker with yellowish bars and white streaks; upper tail coverts glistening yellowish-brown; tail feathers brown edged with the hue of the tail coverts; wing quills chocolate-brown with chestnut edges; sides of head, chin, and throat rich chestnut; lower parts white, all the feathers, except on the centre of the abdomen, with conspicuous wavy edges and cross-bars of blackish-brown; lower tail coverts tawny with, at times, some black marks.

Young birds are uniform rufous-brown above and pale buff below.

Bill bluish-black; iris lightish-red; legs and feet black or lead-colour.

Length 5; wing 2·2; tail 1·75; tarsus ·6; bill from gape ·45.

Distribution.—Our commonest species: abundant all over the low-country and in the hills to about 2,500 feet, or in patana districts to about 4,000 feet. It occurs throughout India, except in the north-west; also in Assam and parts of Burma.

Habits.—A gregarious species occurring in large flocks in paddy fields, grass lands, village gardens, and compounds. It is seldom found far from cultivation, except in patana country. It commits considerable depredations on paddy crops. The birds roost in colonies in low trees and bushes. Breeding appears to be carried on almost throughout the year. The nest is of the usual type and is placed in a low tree, generally a lime or orange tree, or some other thorny species, in an untidy native garden. There are often several nests in the same tree. There are usually four to six white eggs, oval in shape. Average size ·66 by ·45.

Family Fringillidæ.

Sub-family *Fringillinæ*.

Finches.

The Finches agree with the Ploceidæ in having a strong conical bill with the nostrils pierced close to the line of the forehead and near the ridge of the bill. The edges of the mandibles are smooth, the rictal bristles are few and short, and there are twelve tail feathers. The chief outward structural point of difference is that there are only nine primaries in the wing, the first being nearly as long as the second. In the sub-family *Fringillinæ* the bill is moderate in size, and the cutting edges of the mandibles are in contact for the whole length of the bill. The wings and tail are moderate in length, the tarsi and feet fairly well developed. There is one yearly moult, in autumn. The two sexes generally differ in their plumage and young birds resemble adult females.

The Finches are a very large group of birds, found all over the world, except in Australia, but chiefly in cool or temperate regions. They are very poorly represented in Ceylon, the only common species being the ubiquitous House Sparrow, while one other species of a closely allied genus has been recorded as a straggler.

Key to Ceylon Fringillinæ.

A.—A yellow patch on the throat ; bill comparatively long and slender.

Gymnorhis flavicollis flavicollis (Yellow-throated Sparrow).

B.—No yellow patch on throat ; bill short and stout.

Passer domesticus indicus (House Sparrow).

Gymnorhis flavicollis flavicollis.

The Yellow-throated Sparrow.

Gymnorhis flavicollis (Oates, Vol. II., p. 235) ; *Passer flavicollis* (Legge, p. 605).

Description.—Male : Upper plumage from forehead to tail coverts sandy-brown ; lesser wing coverts cinnamon-red ; median coverts brown with white tips ; greater coverts and

secondary quills brown with buff margins and tips ; primaries darker brown with narrow buff margins ; primary coverts black ; chin dull white ; a rich yellow spot on the throat ; the sides of the head and neck and the breast pale ashy-brown ; rest of lower parts ashy-white, darker on the flanks.

In females the throat spot is paler yellow and the shoulder patch is rufous-brown, not cinnamon-red.

Bill, of males, generally black in winter, brown in summer ; of females always brown ; iris dark brown ; legs and feet dusky-bluish.

Length 5·5 ; wing 3·2 ; tail 2·1 ; tarsus ·6 ; bill from gape ·6.

Distribution.—A mere straggler to Ceylon, only once recorded. Legge came across a flock near Madampe in the Chilaw District in October, 1876, and secured two specimens. It occurs over the greater part of India and ranges into Persia.

Habits.—This species goes about in small parties, or occasionally during the winter, in larger flocks. It may be looked for in thin jungle, open country bordered with trees, also in groves or gardens. The chirrup and flight much resemble those of the House Sparrow.

Passer domesticus indicus.

The House Sparrow.

Passer domesticus (Oates, Vol. II., p. 236 ; Legge, p. 600).

Description.—Male : Top of head, from forehead to nape, ashy-gray ; lores and round the eye, chin, throat, and middle of breast black, some of the breast feathers with ashy-white tips ; rest of lower plumage ashy-white ; cheeks, ear coverts, and sides of neck white ; a broad chestnut streak over the eye to the nape ; upper back and scapulars chestnut with broad black streaks ; lower back, rump, and scapulars ashy-gray ; lesser wing coverts chestnut ; median coverts blackish with broad white tips ; greater coverts and innermost quills black with broad rufous margins and paler tips ; remaining quills dark brown with pale rufous edges ; tail feathers grayish-brown with paler edges.

After the autumn moult the feathers of the back and breast have ashy margins, which are soon abraded.

Female.—Top of the head to hind-neck, rump, and upper tail coverts sandy-brown; feathers of back and scapulars pale rufous with blackish inner webs; wing coverts and quills marked as in the male, but both the ground colour and markings are more dingy and in tone with the hue of the back; tail pale brown with light edges; a pale buff stripe over the eye to the nape, with a darker brown stripe below it; sides of head ashy-brown; lower plumage ashy-white, darker on the breast.

Young birds at first resemble the adult female, but the under surface is tinged with buff.

Bill, of males, generally black in winter, horny-brown in summer; of females always brown; iris brown; legs and feet pale brown.

Length 5·7; wing 2·9; tail 2·2; tarsus ·7; bill from gape ·53.

Distribution.—Ubiquitous in every town and village of the Island. The Indian race, which is smaller and lighter than the European form, is found practically throughout the Indian Empire, and extends eastwards to Cochin-China.

Habits.—The Sparrow in Ceylon sticks as closely as in England to the neighbourhood of man, and owing to the more open construction of houses in the east is more of a nuisance inside dwellings than its English relative. It is never found far from habitations, except when the paddy crops are ripening, when with its usual eye to the main chance it visits the fields and threshing-floors in considerable numbers. It feeds on insects, however, as well as on grain. It breeds pretty well all the year round, making a large, untidy nest of dry grass, &c., in any hole or ledge, on the inside or outside of a house, on which it sets its fancy. Once it has settled on a nesting site in any dwelling room or verandah it is most difficult to dislodge. If the nest is demolished, it will be renewed again and again. It will occasionally build in a thick tree or bush. There are usually four, at times five, eggs. They vary a good deal in size and markings. The ground colour is generally

grayish or greenish-white, with markings in various shades of brown or dull grayish-purple, sometimes uniformly distributed, but generally heavier at the large end. Average size ·80 by ·58.

Family Hirundinidæ.

Swallows.

The Swallows are a familiar family found all over the world. Their whole structure is adapted to an aerial existence, and their food consists of insects which are captured entirely on the wing. Their wings are greatly elongated ; there are only nine primaries, the first being almost as long as the second. The bill is broad, flat, and triangular, with a very wide gape, and the merest trace of a hook at the tip ; the rictal bristles are weak. The legs and feet are feeble, and the tarsus is smooth. The tail has twelve feathers, and is generally long and forked. The sexes are alike, and there is only one moult yearly, in the spring. The immature plumage does not greatly differ from that of the adult. Swallows resemble Swifts in their outward form, but there are wide structural differences. The Swift has ten primaries, the first being large, only ten tail feathers, and a hooked bill. The feet of the Swallow are typically Passerine, the Swift has the hind toe either drected forwards or reversible.

Many members of the family are migratory, and found over a wide expanse of the globe ; others are resident, and in some cases confined to a small area. All of the species authentically recorded from Ceylon belong to the genus *Hirundo*—or true Swallow—in which the tarsus and toes are bare, and the greater part of the upper plumage is of a highly glossy blue-black.

The Martins have either the tarsus and toes feathered—genus *Chelidon*—or the upper plumage brown and without gloss—*Cotile* and *Ptyonoprogne*. Legge, however, records that two competent ornithologists, Messrs. Bligh & Parker, have observed, without being able to secure, a species of Martin with a darkish under surface (*vide* Legge, pp. 598 and 1217). If specimens are ever obtained, they may possibly turn out to be a species of Crag Martin—*Ptyonoprogne*—either

P. rupestris or *P. concolor*. The former species has a wide range over the Old World, and the latter is found over a great part of India proper. They might, however, possibly be *Chelidon urbica* with a feathered foot. This last species also is found over a wide extent of Europe, Africa, and Asia, and has been recorded as far south as the Nilgiris and Travancore.

Four species of *Hirundo* occur in the Island. One of these is a common migrant, one a chance visitor; the other two are resident, and one of them is peculiar to Ceylon.

Key to Ceylon Hirundinidæ.

A.—Rump same colour as the back.

(1) A dark glossy band across the chest.
Hurundo rustica rustica (The Swallow).

(2) No dark band across the chest.
H. javanica (Nilgiri House Swallow).

B.—Rump chestnut, contrasting with the dark back.

(1) Lower plumage pale rufous, much paler than the ear coverts.
H. daurica erythropygia (Syke's Striated Swallow).

(2) Lower plumage chestnut of same shade as the ear coverts.
H. hyperythra (Ceylon Swallow).

HIRUNDO RUSTICA RUSTICA.

The Swallow.

Hirundo rustica (Oates, Vol. II., p. 277; Legge, p. 587).

Description.—Forehead, chin, and throat chestnut; lores black; upper plumage, including wing coverts, glossy purplish-blue; wing quills and tail black with a greenish lustre; all tail feathers, except the middle pair, with a white patch on the inner web; sides of the head and neck and a broad band across the breast glossy-black, a few of the feathers on the

breast band fringed with chestnut; rest of lower parts pale rufous, deeper on the tail coverts. In females the lower parts are almost pure white.

The above description applies to the sub-species *H. rustica rustica*, which breeds in Europe and North-western Asia, and winters in Africa and South-western Asia. The Far Eastern race *H. rustica gutturalis*, which breeds in Japan and North-eastern Asia, has the lower plumage below the pectoral band pure white, while the chestnut of the throat encroaches on the black band so as nearly to sever it in the centre. It is also slightly smaller and with a shorter tail. Many of our birds are intermediate between these two races, while there is one specimen in the Museum from the Northern Province, which seems almost typical *gutturalis*.

Yearling birds, of which our visitors largely consist, on their arrival have the top of the head brownish, the forehead grayish, the throat rufescent-white turning in patches to chestnut, and the pectoral band brown. The long outer tail feathers are not fully grown. They assume the adult plumage before leaving in spring.

Bill, legs, and feet black; iris dark brown.

Length up to 7·5; wing 4·6; tail up to 4; tarsus ·4; bill from gape ·57. Females slightly smaller and with shorter tails.

Distribution.—Found all over the Island, but rare at high elevations. As noted above, the European race occurs over the west of the Old World, breeding in temperate climates and wintering in Africa and South-western Asia. In Central Asia this race appears to pass gradually into the eastern form. Many of the birds which winter in the east of India are intermediate between these two races, typical *gutturalis* being seldom found west of the Bay of Bengal.

Habits.—The young birds appear to come first, and arrive, generally *viâ* the north of the Island, about the middle of September. The old birds come a little later. All leave about the middle of April. Both at their coming and going they congregate in large flocks, which seem to find telegraph wires their most convenient perch. They scatter during their stay and hawk far and wide after flying insects.

Hirundo javanica.

The Nilgiri House Swallow.

Hirundo javanica (Oates, Vol. II., p. 279; Legge, p. 597).

Description.—A broad forehead, chin, throat, upper breast, ear coverts, and cheeks rusty-red; lores blackish; upper plumage and lesser wing coverts black with a greenish-blue gloss; wings and tail rusty-black; all the tail feathers, except the middle pair, with a white spot on the inner webs; lower plumage ashy-brown, paling on the centre of the abdomen; under tail coverts blackish, tipped with white.

In young birds the upper plumage is without gloss, and some of the secondaries have rufous margins; the lower parts are paler.

Bill black; iris dark brown; legs and feet brown.

Length 5; wing 4·05; tail 1·8; tarsus ·35; bill from gape ·63; tail only slightly forked.

Distribution.—Resident in the hills, where it is common at the higher elevations, but seldom descends as low as 2,000 feet. It is found in the South Indian hills as far north as the Nilgiris, also in the Andamans, Tenasserim, and Malaya, including the Archipelago.

Habits.—The most familiar Swallow in the higher hills. The flight is easy, but not very swift. The birds often have a regular beat, and are fond of the steep-sided railway cuttings through cabook (laterite), which are so common on the up-country line. They are fearless of man, and frequently build their nests in the eaves of verandahs, or even inside rooms. They are, however, equally ready to breed on the little ledges on the face of rocks, or in cabook cuttings, and I have found the nest in the entrance of a railway tunnel. The breeding season is from April to June, and again in September. The nest is a little half cup of mud, firmly glued to the perpendicular surface, against which it is built, and lined with feathers or occasionally small scraps of rag, &c. The two or three eggs are rather broad ovals, slightly pointed at the smaller end. The ground colour is pinkish-white, with dull purple and reddish-brown markings, chiefly at the larger end. Average size ·66 by ·50.

Hirundo daurica erythropygia.

Syke's Striated Swallow.

Hirundo erythropygia (Oates, Vol. II., p. 283; Legge, p. 594).

Description.—Upper plumage down to the lower back, with the lesser and median wing coverts glossy steel-blue; rump and shorter upper tail coverts chestnut; longer tail coverts glossy-black; remainder of wing and the tail dark brown with a blue gloss on the outer webs; lores brown; the feathers under the eye mixed brown and rufous; ear coverts and a partial collar on the hind-neck chestnut; sides of the neck glossy-blue; the whole lower plumage pale rufous with fine brown shaft-streaks; under tail coverts tipped with black.

Bill and legs black; iris brown.

Length 6·5; wing 4·3; tail 3·2; tarsus ·5; bill from gape ·45.

Distribution.—The Indian race of this Swallow is found over the greater part of the plains of India as far south as the Nilgiris. It is the merest straggler to Ceylon, having been recorded once from the Jaffna peninsula and once from the Uva hills near Haputale.

Habits.—In India this species is found round mosques and other buildings, and also in the vicinity of walls and bridges. The flight is comparatively slow.

Hirundo hyperythra.

The Ceylon Swallow.

Hirundo hyperythra (Oates, Vol. II., p. 284; Legge, p. 592).

Description.—Whole upper plumage, including wings and tail, glossy blue-black, except the rump and shorter upper tail coverts, which are dark chestnut; whole under surface and sides of neck chestnut with narrow indistinct brown shaft-streaks, except on the vent and lower tail coverts; the latter have broad black tips.

In young birds the chestnut parts are paler, the streaks on the throat and fore-neck are broader, and the breast is mottled with blackish-brown.

Bill blackish-brown; iris sepia-brown; legs and feet vinous-brown.

Length 6·6; wing 4·75; tail 3·2; tarsus ·55; bill from gape·6.

Distribution.—A resident species peculiar to Ceylon. It is found all over the low-country and in the central hills up to about 3,000 feet. On the Uva patanas I have seen it at an elevation of about 4,000 feet. In the northern forest tract it is widely distributed, but not very numerous; it is more abundant in the south, especially round Galle, and is occasionally seen in Colombo.

Habits.—May be seen hawking for insects over paddy fields, tanks, marshes, and patanas, as well as round houses in villages and the vicinity of towns. The flight is slower and heavier than that of the common Swallow, but it is often found in company with that species in the low-country and with *H. javanica* in the hills. The breeding season is from April to June. The nest is a solid, retort-shaped structure of mud, glued on to the under surface of a verandah roof, the arch of a bridge or culvert, or the roof of a rock cave. The interior is lined with a felted layer of feathers. The two or three eggs are elongated ovals of pure white without any gloss. Two eggs in my collection measure ·95 by ·57.

Family Motacillidæ.

Wagtails and Pipits.

The Wagtails and Pipits form a family of rather small, slim-built birds, with straight, slender bills, slender legs and feet, and fairly long tails. The wing has only nine primaries, the first being nearly as long as the second; the inner secondaries—or tertiaries—are elongated, and in the closed wing reach almost, if not quite, to the tip of the longest primary. The rictal bristles are fairly well developed. The family, which is found chiefly in the Old World, especially in the north of Europe and Asia, divides naturally into two groups: Wagtails and Pipits. The Wagtails are most daintily formed birds with longish tails, which they vibrate perpetually while standing or running. They frequent grassy lands, or the banks of streams and tanks, running over the ground in search of insects. Most of the species are migratory, and

none of the five forms found in Ceylon are resident ; two are the merest stragglers to the Island. Four of these species belong to the genus *Motacilla*, in which the sexes are alike or almost so. They undergo, however, striking seasonal changes in plumage as well as various metamorphoses between the nestling and adult stages. In consequence birds of the same species may be seen at the same time and place in very different phases of plumage. The characteristics given in the key, however, will always serve to distinguish our four Ceylon species. The remaining Wagtail is a forest bird, which does not undergo such continual changes.

In the Pipits the family characteristics are not so emphasized. With their soberly streaked upper plumage and shorter tails they resemble the Larks.

Three Pipits are found in Ceylon, all being sub-species of *Anthus richardi*. Two of these forms are migratory, the third is a common resident. The sexes are alike. Immature birds are very spotted beneath, the spots becoming reduced in size and number each year of the bird's life. There is little difference between the summer and winter plumage, but the colours are brightest just after the moult, in autumn.

Key to Ceylon Motacillidæ.

I.—Upper plumage, not streaked. Wagtails.

A.—Central pair of tail feathers of same colour and as long as the adjoining pair. Genus *Motacilla*.

(*a*) Rare stragglers, plumage white, black, and gray ; throat and fore-neck black or with a sharply defined black patch ; hind claw curved and shorter than its toe.

(1) Ear coverts and sides of neck white.
M. alba dukhunensis (White Wagtail).

(2) Ear coverts and sides of neck black.
M. maderaspatensis (Large Pied Wagtail).

(*b*) Adult plumage largely greenish above, yellow beneath ; young birds may be grayish above and whitish beneath, but have no black patch on fore-neck.

(1) Tail 3·5 or more, and with three white feathers on each side ; hind claw about ·25 and shorter than its toe.

M. melanope (Gray Wagtail).

(2) Tail about three and with only two white feathers on each side ; hind claw about ·45, and longer than its toe.

M. flava borealis (Gray-headed Wagtail).

B.—Central pair of tail feathers shorter than the adjoining pair and of a different colour.

(1) Wing coverts and breast broadly barred black and white.

Dendrognathus indicus (Forest Wagtail).

II.—Upper plumage streaked ; the two outermost feathers on each side of tail largely white. Pipits.

(1) Length about 7·5 ; tail about 3·2 ; hind claw about ·75 and not much curved.

Anthus richardi richardi (Richard's Pipit).

(2) Length about 7 ; tail about 2·9 ; hind claw about ·5, and considerably curved.

A. richardi striolatus (Blyth's Pipit).

(3) Length about 6·5 ; tail 2·4 ; hind claw about ·5, and not greatly curved.

A. richardi rufulus (Indian Pipit).

Motacilla alba dukhunensis.

The White Wagtail.

Motacilla alba (Oates, Vol. II., p. 287 ; not in Legge).

Description.—Summer : Forehead, front of crown, sides of head, and of neck clear white ; back of crown, nape, hind-neck, chin, throat, fore-neck, and breast deep black ; upper plumage from the nape, with the lesser wing coverts gray ; upper tail coverts black with white margins on the outer webs ; rest of wing coverts and the inner quills blackish with broad white margins ; rest of quills black with narrow white margins ; two outermost pairs of tail feathers almost entirely white, the rest black ; lower parts from breast white,

In winter the chin, throat, and fore-neck become white and the black of the breast is confined to a narrow crescent-shaped patch, the horns of the crescent extending up the sides of the fore-neck.

Young birds in their first autumn resemble adults in winter plumage, but the back of the crown, the nape, and hind-neck are gray, like the back, while the white parts of the head are tinged with primrose-yellow.

Bill black, bluish beneath; iris brown; legs, feet, and claws blackish-brown.

Length about 7·75; wing 3·5; tail 3·6; tarsus ·85; bill from gape ·75.

Distribution.—A recent addition to our list. At the end of November, 1917, I saw several strange Wagtails on the maidan at Puttalam, and secured one which proved to be a young male of this form. The other birds stayed for some weeks, but left at the end of January. This species occurs over most of the Old World, breeding in the north of its range, from the British Isles to Eastern Siberia, and wintering in Southern Europe, Northern Africa, and Southern Asia. It is divided into several sub-species, the present race breeding in Central Siberia and wintering in India and Burma. It seldom, however, penetrates as far as the south of India, though possibly it may occasionally visit the Island unnoticed among other Wagtails.

Habits.—The birds I saw frequented the grassy flats round Puttalam resthouse along with numbers of the Gray-headed Wagtail. It might be looked for on open grassy spaces, wherever there are troops of the last-mentioned species

Motacilla maderaspatensis.

The Large Pied Wagtail.

Motacilla maderaspatensis (Oates, Vol. II., p. 291; Legge, p. 607).

Description.—Male: A broad white eyebrow from the nostril to the nape; head, neck all round, and upper plumage to the tail coverts glossy-black; lesser and median wing

coverts less glossy-black; greater coverts almost entirely white; quills black bordered with white; two outer pairs of tail feathers almost entirely white, the remainder black with narrow white edges; lower parts from breast downwards white, the flanks grayish.

Females are smaller, and their upper plumage is tinged with gray.

Young birds are grayish-brown where the adults are black; the white eyebrow does not extend forward of the eye; there is some white on the chin and throat, and the white parts are tinged with buff.

Bill, legs, and feet black; iris dark brown.

Length about 8·75; wing 3·9; tail 4·1; tarsus 1; bill from gape ·8.

Distribution.—A very rare straggler to Ceylon, having been recorded once from one of the islands of the Northern Province. In India it is resident, and is found ovre practically the whole of India proper.

Habits.—A true Water Wagtail, which is rarely found far from water. It may be looked for near rivers, tanks, &c. It is very active in all its movements. It feeds on insects, and will even tackle dragon-flies.

Motacilla melanope.

The Gray Wagtail.

Motacilla melanope (Oates, Vol. II., p. 293; Legge, p. 610).

Description.—Male in winter: Top and sides of head, hind-neck, back, scapulars, and lesser wing coverts ashy-gray with a brownish-green tinge; rump and upper tail coverts yellowish-green; outermost pair of tail feathers entirely white, next two pairs with some black on the basal portion of the outer webs; three middle pairs black with greenish margins; medium and greater wing coverts and quills dark brown with white margins, which disappear on the outer primaries; a narrow,

dull white eyebrow from the lores to the ear coverts ; chin, throat, and fore-neck white ; rest of lower parts bright yellow, deepest on the vent and under tail coverts.

In spring the lores change to dark brown, the white eyebrow becomes broader and clearer, and the ear coverts dark slate-colour ; the chin, throat, and fore-neck become black with small white edges to the feathers, and there is a broad white moustache stripe down the sides of the neck. Our birds appear to leave before this change is much advanced.

Females in winter resemble males ; in summer the dark throat patch is represented by a row of dark brown spots on each side of the throat and neck ; the lower parts are less bright yellow.

Young birds on their arrival resemble adults in winter, but the chin and throat are tinged with yellow, and the rest of the lower parts are less bright, at times almost white.

Bill horn-colour, paler at the base of the lower mandible ; iris brown ; legs and feet flesh-colour.

Length about 7·5 ; wing 3·15 ; tail 3·7 ; tarsus ·75 ; bill from gape ·7 ; hind claw, measured straight from base to tip ·25.

Distribution.—A regular migrant, arriving about the middle of September, and staying near the coast for a few days after its arrival. The birds then move on, some to the interior of the northern forest tract, but the majority to the hills. They leave again about the end of March.

This species has a wide range, breeding in the temperate climates of Europe and Asia and on the Himalayas, and wintering in Northern Africa and Southern Asia.

Habits.—May occasionally be seen in the sandy beds of rivers in the northern forest tract, but in the hills it is a very familiar species along the streams and water-courses. It is fond of perching on the roofs of houses, on tree stumps and bushes, as well as on rocks in the stream bed. When perched or running it perpetually balances its tail. The flight is undulating, but swift ; the note is a cheerful little whistle. It is by no means shy.

Motacilla flava borealis.

The Gray-headed Wagtail.

Motacilla borealis (Oates, Vol. II., p. 294 ; Legge, p. 617).

Description.—Male on arrival in autumn : From forehead to hind-neck slaty-gray ; back, scapulars, and rump dull olive-green ; upper tail coverts dark brown edged with olive-green ; four middle pairs of tail feathers black with narrow yellowish-green edges ; two outer pairs mainly white ; wing coverts and quills blackish-brown with pale margins often tinged with yellowish-green ; lores and cheeks dark brown ; usually an indistinct whitish eyebrow ; lower parts yellow, the sides of the chest brown ; at times the centre of the breast is mottled with white and blackish-brown.

During the winter the upper parts become worn and browner, and the black bases of the breast feathers become conspicuous.

In summer plumage, to which some birds change before leaving, the head from forehead to nape is dark bluish-gray ; the upper parts become greener, the pale borders of the wing feathers more yellow ; the lores, cheeks, and ear coverts are black, and the whole lower plumage bright yellow.

Females in winter resemble males ; in summer both the upper and lower plumage is duller ; the lores, cheeks, and ear coverts are brown, and the black bases of the breast feathers more conspicuous.

Birds in their first autumn are rather different ; the upper parts are grayish-brown, which shades into gray-blue on the rump ; the upper tail coverts are black edged with gray ; the tail and wings as in the adult, but the edges of the wing feathers are white ; there is a broad whitish eyebrow ; lores and ear coverts grayish-brown ; lower parts white, the breast darker and at times mottled with brown.

Bill, blackish-brown, paler at the base of the lower mandible ; iris brown ; legs and feet dark horn-colour.

Length about 6·75 ; wing 3·2 ; tail 3·1 ; tarsus ·9 ; bill from gape ·7 ; hind claw measured straight ·45.

Distribution.—The Gray-headed Wagtail, divided into several geographical races, is found over the greater part of the Old World, breeding in the north and wintering in the south. The present sub-species breeds in Northern Europe and Western Siberia, wintering in Africa and in Southern Asia as far east as the Malay Peninsula. It is one of our commonest Passerine migrants, arriving about the middle of September. It is abundant during the north-east monsoon all over the low-country, but is less numerous in the south-east of the Island than in the north. In the hills it is not nearly so common as the last species. It leaves for the most part in April.

Habits.—On its first arrival this Wagtail may be seen in swarms on grassy flats near the sea in the west and north of the Island. A number of birds remain in these haunts. Others spread inland to newly ploughed paddy fields, grassy land round tanks, &c. They are restless birds continually running about or taking short flights in their hunt for flies and other small insects. They roost at night in large colonies in the long grass of swamps, &c.

Dendrognathus indicus.

The Forest Wagtail.

Limonidromus indicus (Oates, Vol. II., p. 300; Legge, p. 614).

Description.—Upper plumage, including ear coverts and lesser wing coverts, dull olive-green; tail coverts blackish-brown; median and greater wing coverts black with broad whitish tips, which form two conspicuous wing bars; wing quills brown, the innermost secondaries with broad olive-brown tips, remaining quills with edges of yellowish-white on the central portion of the outer webs; most of the primaries also with a patch of the same colour near the base; middle pair of tail feathers the same hue as the back; next three pairs blackish-brown, the next pair white with broad brown bases, the outermost pair almost entirely white; cheeks, chin, throat, and lower plumage white with a yellow tinge on the chest, which is crossed by two broad black bands, the lower band being incomplete in the middle.

Bill, upper mandible dark brown, lower flesh-colour; iris olive-brown; legs and feet flesh-colour.

Length 6·5; wing 3·1; tail 2·8; tarsus ·85; bill from gape ·75.

Distribution.—A migrant, breeding in Northern China and Eastern Siberia, and wintering from India eastwards to Southern China, but rare in most parts of India.

In Ceylon it is almost confined to the northern forest tract, but may occasionally be met with elsewhere.

Habits.—Generally found by the grassy sides of roads running through forest. It is, for instance, fairly numerous from October to March on the sides of the roads leading from Puttalam to Anuradhapura and Kurunegala. The birds are generally in pairs, which keep flying in front of one in little flights of about 100 yards, perching on low branches, and moving on as one catches up with them. They will continue in this manner for some distance before they double back. When hunting for food they run about on the ground and wag their tails from side to side, instead of up and down as other Wagtails do.

Anthus richardi richardi.

Richard's Pipit.

Anthus richardi (Oates, Vol. II., p. 307); *Corydalla richardi* (Legge, p. 621).

Description.—Upper plumage fulvous-brown, the feathers of the head and back with dark brown centres; wings dark brown with brownish-buff margins; outermost tail feathers almost entirely white, the next pair brown at the base, along the shaft and on the marginal portions of the inner web, the rest dark brown with paler edges; a broad buff stripe above the eye; lower plumage browny-buff; the sides of the throat, the fore-neck, and breast streaked with dark brown.

Bill brown, paler beneath; iris brown; legs flesh colour.

Dimensions a little variable; length about 7·7; wing 3·75; tail about 3·2; tarsus 1·2; bill from gape ·8; hind claw about ·75, and not greatly curved.

Distribution.—This, the largest race of the species, breeds in Central Asia and Siberia. In winter it is found over a wide extent from the British Isles and France to China; it occurs at this season over the eastern half of India proper and the whole of Burma. In Ceylon it arrives about the beginning of October, and some birds linger till May. It spreads fairly widely throughout the low-country, but is found chiefly in the maritime districts. It occurs on the hills on some of the lower patanas, but does not appear to ascend to any great elevation. In Colombo it is not much seen before February, apparently visiting that part of Ceylon only on its return journey.

Habits.—Usually met with on pastures and grassy flats, especially near the sea, in company with its smaller resident relative *A. r. rufulus*. It may sometimes be found, generally just after its arrival or before its departure in the longer grass of marshy lands. It is a swift runner, and has a rapid undulating flight.

Anthus richardi striolatus.

Blyth's Pipit.

Anthus striolatus (Oates, Vol. II., p. 308); *Corydalla striolata* (Legge, p. 628).

Description.—In plumage it resembles *A. r. richardi*, but is rather smaller; the tarsus and feet are shorter and the hind claw is considerably shorter and more curved.

Length about 7; wing 3·5; tail 2·9; tarsus 1; bill from gape ·75; hind claw ·5, and considerably curved.

Distribution.—Breeds at high elevations on the Himalayas and winters throughout the Indian Empire. Not very much is known of its distribution in Ceylon, but it probably escapes notice owing to its resemblance to Richard's Pipit. The only authentic record of its occurrence in the Island is by Legge, who found it south of Trincomalee near the Virugal-oya.

Habits.—Resemble those of Richard's Pipit. It may be looked for on pasture lands near the sea. It runs about actively, with sudden halts, and holds itself very erect. According to Brookes, it rises with a loud discordant note.

ANTHUS RICHARDI RUFULUS.

The Indian Pipit, or Titlark.

Anthus rufulus (Oates, Vol. II., p. 308); *Corydalla rufula* (Legge, p. 625).

Description.—A much smaller edition of *A. richardi richardi*, but the tone of the upper plumage is grayer and the lower parts generally whiter. The bill is proportionately larger.

Dimensions a little variable. Length about 6·5; wing 3·15; tail 2·4; tarsus 1; bill from gape ·75; hind claw ·5.

Distribution.—A resident form, found throughout the Indian Empire and thence south-east to the Malay Archipelago and the Philippines. It also occurs over a great part of Africa. It is found abundantly throughout the whole Island, except at the very highest elevations, such as the Horton Plains, where it is scarce.

Habits.—May be met with everywhere, on grassy flats near the sea, pastures, dry paddy fields, and open patanas. It is very tame and fearless, and runs about actively through the heat of the day. The flight is swift and undulating. It breeds during the dry weather from April to July. The nest is a small cup of dry grass and grass roots, well concealed in a slight depression under the shelter of a tussock of grass. The lining is of finer material than the outside of the nest. The two or three eggs are almost oval in shape. The ground colour is whitish, or at times greenish stone, generally fairly thickly spotted with dull brown and occasionally fainter markings of dingy purple. I have two clutches which are much darker and with deep brown, streaky markings covering the greater part of the surface. Average size of a fair Ceylon series ·80 by ·60.

Family ALAUDIDÆ.

Larks.

The typical Larks closely resemble the Pipits, having the same soberly streaked plumage and long inner secondaries. They are, however, slightly plumper in form, the bill is not quite so slender, and the tail a little shorter, while unlike the Pipits they soar and sing while soaring. They are also distinguished from them and from all other Indian Passeres by the transversely scutellated hinder aspect of the tarsus.

In all the other families the hinder aspect of the tarsus is covered by two long " laminæ " or thin scales, which run, one on each side of the back edge of the tarsus, from the toes to the tarsal joint. In the Larks this covering consists of several scales on each side, which are set transversely and overlap.

All the Ceylon forms have ten primaries, the first being always small, and in one form miscroscopic. In some outside genera the first primary is altogether wanting. The wing, as a rule, is somewhat pointed, the head is often crested, but no Ceylon species has a perceptible crest. The shape of the bill varies considerably in the different genera, but the edges of the mandibles are smooth, except for a slight notch in the upper one. The rictal bristles are well developed.

Larks are found all over the Old World, but only one genus occurs in America and they are unknown in Australia. They are somewhat gregarious, and generally frequent cultivated or open grass lands, while many are desert-loving species. Three forms, each belonging to a different genus, occur in Ceylon. The main generic distinctions are given in the following key.

Key to Ceylon Alaudidæ.

A.—Sexes similar ; bill moderate ; length about 6.

(1) First primary exceedingly minute ; nostrils concealed by plumelets ; wing somewhat pointed ; outside tail feather almost entirely white, the next with a whitish outer web and tip ; hind claw long and straight.

Alauda gulgula australis (Indian Sky Lark).

(2) First primary nearly half length of second ; nostrils exposed ; wing round ; outside tail feather brown with a rufous-white border on the outer web ; hind claw long and curved.

Mirafra affinis (Madras Bush Lark).

B.—Sexes dissimilar ; bill short and deep ; length about 5 ; nostrils covered with plumelets ; tarsus short.

Pyrrhulauda grisea grisea (Ashy-crowned Finch Lark).

ALAUDA GULGULA AUSTRALIS.

The Indian Sky Lark.

Alauda gulgula (Oates, Vol. II., p. 326 ; Legge, p. 630 and 1217).

Description.—Feathers of upper plumage rich, dark brown broadly edged with brownish-buff ; on the hind-neck and upper back the margins are very broad, the brown being reduced to a wide shaft-stripe ; wing coverts slightly paler brown and with whitish tips ; wing quills brown with fulvous margins, the outer webs tinged with rufous at the base ; the outside tail feather almost entirely buffy-white ; the next with the outer web and extreme tip buffy-white, rest of tail brown with paler margins ; a whitish streak from the nostrils over the eye ; ear coverts and cheeks streaky-brown ; lower plumage pale, slightly rufous-buff, the breast boldly streaked with dark brown ; sides of the body more faintly streaked.

Young birds are more rufous ; the feathers of the upper surface are rounded and white at the tips.

Bill dark horny-brown above, paler beneath ; iris brown ; legs fleshy-brown.

Dimensions rather variable ; length about 6·3 ; wing 3·35 ; tail 2·1 ; tarsus ·9 ; bill from gape ·7.

Distribution.—The Indian Sky Lark is found almost throughout the Indian Empire, and ranges eastwards to Southern China and the Philippines. The present sub-species occurs in Southern India and Ceylon. With us it appears to be resident all the year round in the drier parts of the low-country. In the damp west and south-west it is only a north-east monsoon visitor, probably because it nests on the ground, and in these parts cannot be sure of a dry spell during the breeding season. It is also resident in the drier hill country, and I have found it breeding at 4,500 feet on the Uva Patanas.

Habits.—Much the same as those of the English Sky Lark. It is fairly abundant on the grassy flats round the coastal lagoons and at the head of some of the larger inland tanks. The song is not so loud or sustained as that of the English Sky Lark, nor does it mount and sing for so long a period. The breeding season is during the dry weather, from April

to July. The nest is a neatly made little cup of grass and grass roots, lined with finer materials of the same nature and built in a little depression of the ground under the shelter of a tussock of grass. The two or three eggs are slightly pointed ovals in shape. There are two types. In one the egg is a dull whitish stone-colour, thickly spotted, chiefly at the larger end, with dull, dark brown over fainter marks of dingy purplish-gray. In the other the colour is a more glossy whitish with smaller and more evenly scattered freckles of yellowish-brown and dull gray. Average size ·84 by ·60.

Mirafra affinis.

The Madras Bush Lark.

Mirafra affinis (Oates, Vol. II., p. 335; Legge, p. 634).

Description.—Upper plumage and wing coverts dark brown with broad, brownish-buff margins, which are paler on the hind-neck and wing coverts; wing quills brown with rufous margins and a rufous area on the basal portions of the inner webs; tail feathers brown with pale rufous edges, the outside feather with a broader edge on the outer web; lores brownish; an indistinct buff streak over the eye; ear coverts and cheeks buff streaked with brown; lower parts whitish-buff, palest on the chin and throat, the lower throat and the breast streaked with broad, triangular patches of rich brown; flanks tinged with brown.

Bill: upper mandible dark brown, the margin and lower mandible, except the tip, flesh-coloured; iris reddish or yellowish-brown; legs and feet fleshy-white.

Dimensions rather variable: length about 6; wing 3·2; tail 2; tarsus 1; bill from gape ·7.

Distribution.—Common all over the low-country, except in the dampest districts where it is not so abundant. It is not found in the hills except as a straggler. It also occurs over a large part of Southern India.

Habits.—Found wherever there is dry pasture or any little open stretch of dry grass. It is fond of perching on bushes or dead branches of trees. The song is sweet, but low and not nearly so sustained as that of the Sky Lark. The bird

when singing mounts rapidly for a short distance and then sinks down with its wings extended. The breeding season is from about April to July. The nest much resembles that of the Sky Lark, and is placed in similar situations, but is at times more or less domed with a thin covering concealed among the dry stems and blades of the tussock of grass, in the shelter of which it is placed. The two or three eggs are rather broad, slightly pointed ovals. The ground colour is whitish with generally a fair amount of gloss. The markings vary a good deal in size and density, and range from reddish to yellowish-brown over paler marks of dull purple and purplish-gray. Average size ·84 by ·63.

Pyrrhulauda grisea grisea.

The Ashy-crowned Finch Lark.

Pyrrhulauda grisea (Oates, Vol. II., p. 341; Legge, p. 637).

Description.—Male: Upper plumage ashy-brown, the feathers with pale gray margins, which are broadest on the forehead and crown; wing coverts and quills dark brown with whitish-gray margins, wider and more conspicuous on the coverts and inner quills; tail feathers light brown with whitish edges, the outer feather at times almost wholly white; lores, front part of cheeks, a streak over the eye, chin, throat, sides of neck, and lower parts to the tail coverts brownish-black; hind cheeks and ear coverts white; a grayish-white patch on the sides of the breast.

Female: The upper plumage is darker brown, at times tinged with rufous; the gray margins are narrower and darker, the whitish margins of the wing feathers not so conspicuous; ear coverts brown and gray, like the crown; those parts, which in the male are black or white, are grayish-white with ill-defined, dingy brown streaks.

Immature birds resemble females, but the margins on the upper plumage are broader and more distinct.

Bill whitish in males, a little darker in females; iris dark brown; legs and feet flesh-colour.

Length about 5; wing 3; tail 1·75; tarsus ·6; bill from gape ·5.

Distribution.—This little species is found in the plains throughout the greater part of India proper. The Ceylon form appears to be a good sub-species, which probably also occurs in the dry south-east corner of India. With us it is confined to the dry maritime zones of the north, north-west, and south-east, but it occasionally straggles, probably storm-driven, to other parts, and has been seen in Colombo and at the top of Ramboda Pass.

Habits.—Found in little troops on arid plains near the coast. It feeds on the ground and squats very close, occasionally taking short little flights in the air, when it gives out a cheerful but weak little warble. The breeding season is from May to July. The nest is placed in a small depression on the bare plain, right out in the open, occasionally in the centre of an old desiccated patch of cowdung. It is a minute, shallow cup of fine, dry grass and grass roots, with occasionally a scrap of wool in the thin lining. The top is neatly levelled off flush with the surface of the ground so that the nest absurdly reminds one of a hole in a bagatelle board. There are only two eggs. The ground colour is whitish, rather sparingly, but evenly freckled with fine spots of yellowish-brown. Occasionally the markings form a zone round the middle. Average size ·75 by ·54.

Family Zosteropidæ.

Genus **Zosterops.**

White-eyes.

The White-eyes are a group of which the classification has been much in dispute. Oates has placed them among the *Crateropodidæ*, other ornithologists either with the Sunbirds —*Nectariniidæ*, the Flowerpeckers—*Dicæidæ*, or the Honey-eaters—*Meliphagidæ*. Their natural affinities, on the whole, seem to be near the Sunbirds, and I have followed Stuart Baker, who accords them family rank and places them just before that group. They are all very small, arboreal birds, which are found over a great part of Africa and in Southern Asia and Australia. The bill is curved, slender, and pointed,

the rictal bristles are few and small. The tongue is peculiar; according to Gadow, it is split into two and each half is broken up into numerous, stiff, horny fibres, like a little brush. The nostrils are covered by a large membrane and the eye is surrounded by a velvety fringe of small white feathers—a very characteristic mark of the family. The wing is short and rounded; there are ten primaries, the first being microscopic. The tail is short and square, the legs and feet weak. Two species occur in Ceylon, one of which is peculiar to the Island.

Key to Ceylon Zosteropidæ.

(1) Upper plumage greenish-yellow.
Zosterops palpebrosa palpebrosa (Indian White-eye).

(2) Upper plumage dark olive-green.
Z. ceylonensis (Ceylon White-eye).

Zosterops palpebrosa palpebrosa.

The Indian White-eye.

Zosterops palpebrosa (Oates, Vol. I., p. 214; Legge, p. 582).

Description.—Upper plumage greenish-yellow, slightly purer yellow on the forehead and upper tail coverts and on the sides of the neck, where it blends into the primrose-yellow of the throat and fore-neck; wings and tail brown, edged with the same greenish-yellow hue as the sides of the neck; a ring of white feathers round the eye; lores and a small streak below the eye black; breast, abdomen, and flanks grayish-white, the centre of the abdomen at times faintly washed with yellow; under tail coverts yellow; wing-lining white.

Bill blackish, bluish at base of lower mandible; iris rather variable, generally grayish or brownish-olive; legs and feet slate blue.

Length 4·25; wing 2·1; tail 1·6; tarsus ·6; bill from gape ·47.

Distribution.—Found all over the low-country and in the hills to about 4,000 feet, above which it is replaced by the next species. This White-eye, divided into several races, occurs all over India proper and in part of Upper Burma.

Habits.—A rather gregarious little bird, which associates in flocks or small parties, hunting among the leafy boughs of trees, either in forests or gardens. It feeds partly on insects, partly on buds and flowers. The breeding season is mainly from June to August. The nest is a dainty little cup of tendrils, fine grass stalks, and moss woven together with cobwebs, and generally lined with a little vegetable down. It is placed in the slender fork of a small branch about 6 to 20 feet from the ground. The two eggs are pale, uniform blue, and are rather pointed at the small end. Average size ·62 by ·46.

Zosterops ceylonensis.

The Ceylon White-eye.

Zosterops ceylonensis (Oates, Vol. I., p. 215; Legge, p. 585).

Description.—Upper plumage and sides of neck dark olive-green, paler on the rump and darker on the crown and forehead; wings and tail brown edged with the green of the back; a ring of white round the eye; lores and a small streak below the eye blackish; chin, throat, neck, and upper breast, thighs and tail coverts greenish-yellow; lower breast, abdomen, and flanks grayish-white, the abdomen at times tinged with yellow; wing-lining white.

Bill blackish, base of lower mandible bluish or slaty; iris variable, generally yellowish or reddish-brown; legs and feet bluish or pale leaden.

Length 4·6; wing 2·2; tail 1·7; tarsus ·65; bill from gape ·6.

Distribution.—Peculiar to Ceylon and confined to the hills down to about 3,000 feet.

Habits.—Gregarious like the last species. It is found in little flocks among forest, in trees and bushes on open places near woods, or in leafy gardens. It breeds from March to May. The nest and eggs closely resemble those of the last species. Average size of eggs ·64 by ·45.

Family NECTARINIIDÆ.

Sub-family *Nectariniinæ*.

Sunbirds.

The Sunbirds are a family of small birds, which, in the Tropics of the Old World, correspond to the Humming Birds of Tropical America. Together with the next family—*Dicæidæ*—they are characterized by the finely serrated edges on the terminal third of each mandible. The tongue is tubular; the bill long, curved, and cylindrical; the rictal bristles are short; the wings moderate; there are ten primaries, the first being small; the legs and feet are weak, the claws curved and sharp.

The sexes are markedly different; the males are clad mainly in brilliant metallic hues, the females in a more sober garb, generally of pale brown above and yellow beneath. Most field observers are of the opinion that for two or three months in the year the males of most species drop their breeding plumage and more or less resemble females. Oates, however, after examining the large series from India in the British Museum, states that this cannot be so, as the series includes males, in full plumage, shot in practically every month of the year, and that it is only immature males which resemble the hens. His data may, however, be accounted for by the fact that the off-season plumage is, admittedly, worn for only a short period, and that the breeding season, as often happens in India, overlaps in different localities, or even in some districts, with different birds.

Sunbirds are entirely arboreal, and feed mainly on nectar, which they extract from blossoms with their long tongues. They do not, however, hover on the wing, for sustained periods while sipping, as do Humming Birds, but cling, while feeding, to an adjoining stem. They nearly all build the most beautiful little pear-shaped nests, which are hung from a twig or the under side of a broad leaf, but one Ceylon species—Loten's Sunbird—as will be noted, is an exception to this rule.

Four species have been recorded from Ceylon, all belonging to one genus—*Arachnechthra*—of the sub-family *Nectariniinæ*. The other Indian sub-family, the Spider Hunters—*Arachnotherinæ*—is not represented in the Island.

Key to Ceylon Nectariniinæ.

A.—Bill large, over ·75 inch* ; males in full plumage with metallic and dark hues ; females pale brown above, uniform dingy yellow beneath.

(1) Bill over 1 inch ; males with snuff-brown abdomen.
Arachnechthra lotenia (Loten's Sunbird).

(2) Bill ·8 inch ; males with blue-black abdomen.
A. asiatica (Purple Sunbird).

B.—Bill smaller, ·6 inch * ; males with brilliant plumage above and on fore-neck and upper breast ; lower breast and abdomen in both sexes yellow.

(1) Males : upper tail coverts metallic red ; females : uniform pale yellow beneath, rump and upper tail coverts dull red.
A. minima (Small Sunbird).

(2) Males : upper tail coverts metallic purple ; females : chin and throat ashy-white ; rest of lower parts bright yellow.
A. zeylonica (Purple-rumped Sunbird).

ARACHNECHTHRA LOTENIA.

Loten's Sunbird.

Arachnechthra lotenia (Oates, Vol. II., p. 358) ; *Cinnyris lotenius* (Legge, p. 563).

Description.—Male in full plumage : Head, upper plumage, and lesser wing coverts metallic green, changing to lilac according to the angle from which it is viewed ; greater coverts and wings deep brown ; tail black glossed with purple ; chin and throat dull purple with, in certain lights, a metallic green gloss, which becomes more brilliant on the sides of the neck ; breast a stronger purple ; rest of lower parts snuff brown, separated from the purple of the breast by a band of maroon red ; on each side of the breast a small yellow tuft, at times mixed with orange.

* *I.e.*, the distance in a straight line from gape to tip.

Female: Upper plumage, including wings and sides of head and neck, olive-brown; tail black, the outer feathers with brownish-white tips; lower parts dull yellow.

Males after the autumn moult resemble females, with the exception of a broad metallic stripe down the fore-neck and a certain amount of metallic gloss on the lesser wing coverts and tail coverts. The breeding plumage is gradually assumed after a few weeks.

Bill, legs, and feet black; iris brown.

Length 5·5; wing 2·3; tail 1·6; tarsus ·6; bill from gape 1·1. Females are slightly smaller.

Distribution.—Common in most parts of the low-country, except in the arid coast zone of the north, north-west, and south-east. It occurs in the hills up to about 3,000 feet, in certain localities considerably higher. It is also found in Southern India.

Habits.—Familiar in flower gardens throughout its range. In the jungle it avoids forest, and is commonest in open bushy spaces near trees. It feeds mainly on the nectar and pollen of flowers, and is very partial to *Hibiscus* blossoms. At times it eats small spiders and other soft insects. The breeding season is from February to May. The nest is usually, not the little hanging structure made by most species, but placed in the large flocculent masses of cobweb spun in low bushes by a certain species of spider.

In the interior of the mass the birds press out a more or less globular chamber, lining the walls with vegetable down, and generally providing a little eave of cobweb over the entrance, which is at one side. If spider's webs are not available, they appear on occasions to construct a little pear-shaped, hanging structure like that of the next species. The two or, very rarely, three eggs are long ovals, rather pointed at the small end. The ground colour is grayish-white, evenly marked all over with fine, streaky spots of grayish-brown, at times with a dull purplish or greenish tinge. Occasionally the marks are concentrated in a zone towards the large end. Average size ·69 by ·46.

ARACHNECHTHRA ASIATICA.

The Purple Sunbird.

Arachnechthra asiatica (Oates, Vol. II., p. 359); *Cinnyris asiaticus* (Legge, p. 566).

Description.—Male in full plumage: Upper parts, including lesser wing coverts and sides of head and neck, metallic green glossed with purple when viewed at certain angles; greater wing coverts and wings dull, dark brown very faintly washed with purple; tail black glossed with purple; chin, throat, and fore-neck dark metallic purple; breast metallic greenish-blue glossed with purple; pectoral tuft yellow, at times streaked with orange; remainder of lower parts black, shot with deep blue; lower tail coverts more metallic and glossed like the breast; below the breast there is at times an incomplete dull maroon band.

Female: Upper plumage pale olive-brown; wing coverts and quills darker and with pale edges; tail blackish with narrow whitish tips on the outer feathers; an indistinct whitish eyebrow; lower plumage fairly bright yellow.

Males after the autumn moult resemble females, except for a broad stripe of purple down the fore-neck, while the wing coverts, quills, and tail remain practically unchanged.

Bill, legs, and feet black; iris deep brown.

Length 4·5; wing 2·25; tail 1·4; tarsus ·55; bill from gape ·8.

Distribution.—A little local, but found over the greater part of the Island, at all elevations, where there is open bush-covered country; it is commonest in the drier districts. It occurs all over India and most of Burma and ranges into Persia on the north-west and Cochin-China on the east.

Habits.—Very similar to those of Loten's Sunbird. Like that species it feeds on spiders, &c., as well as on nectar. The breeding season is during the first half of the year. The nest is a beautiful, little pear-shaped structure hung from a twig. The walls are made of all sorts of little scraps of dry grass, dead wood, &c., woven together with cobwebs. The outside is ornamented with little bits of bark, dried flower

buds, empty chrysalis cases, scraps of dead twigs, &c., the interior is lined with soft vegetable down; the entrance is at one side, and is protected by a neat little eave. There are generally two eggs. These are typically a little less elongated than those of the last species. The ground colour is generally brownish-white, evenly marked all over with fine streaky spots of brown; zonally marked specimens are by no means rare. Average size ·67 by ·47.

Arachnechthra minima.

The Small Sunbird.

Arachnechthra minima (Oates, Vol. II., p. 363); *Cinnyris minimus* (Legge, p. 572).

Description.—Male in full plumage: Forehead and crown metallic green; lores, cheeks, and ear coverts black; back and scapulars crimson; rump and upper tail coverts bright metallic red with a lilac gloss; lesser and median wing coverts black with crimson tips; greater coverts and quills dull black; chin and throat metallic lilac; upper breast and sides of neck crimson; rest of lower parts pale yellow, separated from the crimson chest by a band of black; pectoral tufts sulphur yellow.

Females: Head, hind-neck, back, and scapulars olive-green; rump and upper tail coverts dull red; tail feathers dark brown with rufous edges; wings brown with olive-green edges to the feathers; lower plumage pale yellow.

After the autumn moult males resemble females, but retain the lilac rump and a little red on the shoulder of the wing.

Bill, legs, and feet black; iris dark brown.

Length about 3·75; wing 1·9; tail 1·3; tarsus ·6; bill from gape ·6.

Distribution.—The inclusion of this bird in the Ceylon list rests on the records of Layard and Holdsworth, the former of whom recorded it from the north of the Jaffna peninsula, while the latter stated that it is occasionally seen near Colombo. It may be looked for in the extreme north of the Island. In India it is found on the west of the peninsula, from about Bombay to Cape Comorin.

Habits.—In India this species goes about in little troops of three or four and shifts its quarters a good deal. It is found in gardens and low brushwood. On the Nilgiris it breeds about September. The nest and eggs are small editions of those of *A. asiatica*. Size of eggs about ·62 by ·42.

ARACHNECHTHRA ZEYLONICA.

Purple-rumped Sunbird.

Arachnechthra zeylonica (Oates, Vol. II., p. 364); *Cinnyris zeylonicus* (Legge, p. 569).

Description.—Male: Forehead, crown, and lesser wing coverts metallic green shot in some lights with lilac; hind-neck, sides of neck, back, scapulars and median coverts, and a band across the fore-neck dull, deep maroon; rump and upper tail coverts metallic purple; greater wing coverts and quills dark brown with rust-coloured edges; tail dull black faintly washed with purple, the outer feathers with traces of a white tip; sides of head copper-brown; chin and throat metallic purple; breast, abdomen, and under tail coverts bright yellow; flanks and wing-lining silky, grayish-white.

Female: Upper plumage grayish-brown, the back tinged with green; upper tail coverts and tail black, the outer tail feathers with traces of a white tip; wings brown, the quills with rufous edges; an indistinct whitish eyebrow; sides of head ash-gray; cheeks, chin, and throat grayish-white; rest of lower parts yellow; flanks and wing-lining silky, grayish-white.

Bill, legs, and feet black; iris red.

Length about 4·5; wing 2·1; tail 1·4; tarsus ·6; bill from gape ·6.

Distribution.—Common all over the Island, ascending during the north-east monsoon to the highest elevations. It is most abundant in the districts with a fairly heavy rainfall. In India it occurs over the peninsula proper and in Bengal.

Habits.—Familiar in town gardens, but it is also more partial than the other species to heavy jungle and forest. Like our other Sunbirds, it feeds on soft insects as well as on nectar and pollen. The breeding season is mainly during the

first half of the year. The nest is a little pear-shaped structure, like that of the Purple Sunbird, but usually a trifle more globular and more carefully concealed, being generally hung from a twig at the back of a bunch of leaves instead of in plain view. There are two eggs. The ground colour is dull greenish or greenish-white, the markings greenish or olive-brown, often arranged mainly in a zone or a cap near the large end. Average size ·62 by ·46.

Family Dicæidæ.

Flowerpeckers.

Like the Sunbirds, the Flowerpeckers have the termina third of both mandibles serrated, though the serrations are so fine that the aid of a lens is required to see them, except in a very good light. The bill, however, is short and triangular, not long and cylindrical. The rictal bristles are poorly developed, but in some forms the nostrils are covered by a tuft of hairs.

The wing in certain genera has nine primaries, in others, including all our Ceylon species, there are ten, the first being small. The tail is always short, and the legs and feet weak. Most Flowerpeckers build elaborate little hanging nests resembling those of the Sunbirds.

All the species are of extremely small size. The forms found in Ceylon are rather sober hued, but many of the family are brilliantly coloured. In some species the sexes are dissimilar. The family is found over the Oriental region and a part of Australia. None of them are migratory. Three species, each belonging to a separate genus, occur in Ceylon and one is not found elsewhere.

Key to Ceylon Dicæidæ.

A.—Bill slender.

(1) Sexes alike ; lower parts grayish.

Dicæum erythrorhyncum (Tickell's Flowerpecker).

B.—Bill stout ; lower mandible swollen.

(1) Sexes dissimilar ; lower parts white and yellow ; nostrils covered with hairs.

Acmonorhyncus vincens (Legge's Flowerpecker).

(2) Sexes alike ; lower parts ashy-yellow streaked with greenish-brown ; nostrils exposed.

Piprisoma squalida squalida (Thick-billed Flowerpecker).

Dicæum erythrorhyncum.

Tickell's Flowerpecker.

Dicæum erythrorhyncum (Oates, Vol. II., p. 381) ; *Dicæum minimum* (Legge, p. 574).

Description.—Upper parts ashy-olive, slightly tinged with green towards the rump ; wings and coverts brown, the coverts and inner secondaries with paler edges ; tail blackish-brown ; lores and cheeks whitish, darkening on the ear coverts ; lower parts grayish-white, the sides of the chest darker, the centre of the breast and abdomen tinged with buff.

Bill, dark brown above, fleshy beneath ; iris brown ; legs and feet brownish slate-colour.

Length 3·3 ; wing 1·8 ; tail ·95 ; tarsus ·5 ; bill from gape ·45.

Distribution.—Common all over the Island at all elevations. It occurs over the greater part of India and in portions of Burma.

Habits.—Our smallest bird. It is generally found wherever there are trees infested with the parasitic Loranthus, on the berries of which it feeds with avidity. In the forest it also feeds on the berries of jungle creepers. Usually not more than two birds are seen together. It is a restless little species, continually darting from branch to branch. The cry is a sharp, but weak little chirp. The breeding season appears to be from April till August. The nest is generally a pear-shaped

structure, like that of a Sunbird, but I once saw a nest, presumably of this species, like a little hammock suspended at either end from a twig. The two or three eggs are pure white, glossless ovals. Average size ·6 by ·40.

Acmonorhyncus vincens.

Legge's Flowerpecker.

Acmonorhyncus vincens (Oates, Vol. II., p. 382); *Pachyglossa vincens* (Legge, p. 577).

Description.—Male: Top and sides of head, the upper plumage, and lesser wing coverts dull, steel blue, paling a little on the rump; the concealed bases of the feathers black; wings and tail blackish, the coverts and inner secondaries edged with the hue of the back, the secondaries faintly edged toward the tip with bluish-green, the basal portion of the inner webs of the quills white; four central tail feathers unmarked, the remainder with white tips, increasing in breadth on the outer feathers; chin, throat, and chest white; breast saffron-yellow, paling to almost white on the lower tail coverts.

Female: Head and hind-neck ashy-blue; upper plumage olive-brown, tinged with green on the lower back and rump; wings and tail not so black as in the male; lower parts not so brightly coloured.

Bill black, paler at base of lower mandible; iris brownish-red; legs and feet blackish-brown.

Length 4·1; wing 2·35; tail 1·2; tarsus ·5; bill from gape ·45. Females are slightly smaller.

Distribution.—Peculiar to Ceylon, and confined mainly to the forest of the wet low-country zone, but it has recently been recorded from Pussellawa in the Central Province at an elevation of 3,000 feet.

Habits.—Rather a rare little bird, living entirely among, or near heavy jungle. It associates in small flocks, hunting among creepers on the trunks of trees for berries. Nothing is known of its nidification.

Piprisoma squalida squalida.

The Thick-billed Flowerpecker.

Piprisoma squalida (Oates, Vol. II., p. 382); *Piprisoma agile* (Legge, p. 579).

Description.—Upper plumage olivaceous-brown, the rump and upper tail coverts tinged with green; wings and tail brown edged with olive, the tail feathers with white tips, broad on the two outer feathers, more narrow on the others; lores grayish; face and ear coverts brownish; chin and throat white; a narrow brown streak down each side of throat; lower parts pale ashy-yellow with greenish-brown streaks.

Bill leaden brown; iris orange with a golden inner circle legs dusky lead-colour.

Length 4; wing 2·2; tail 1·1; tarsus ·5; bill from gape ·4.

Distribution.—Rather rare; its chief haunts appear to be in the interior of the northern forest tract, but it occurs sparingly in Uva and parts of the Central Province. It occurs over a great part of India proper.

Habits.—Keeps rather to the tops of trees in forest, where it feeds on spiders and small insects. The breeding season is probably in April and May. The nest resembles a little pocket, with the opening at one side, hung from a twig. It is composed of vegetable fibres and flower buds felted together with cobwebs so firmly that it can be squeezed up and yet regain its shape. The two or three eggs are white or pinkish, freckled over with small brownish-pink or claret-coloured spots. Average size (of Indian eggs) ·63 by ·45.

Family Pittidæ.

Pittas.

The Pittas (*vide* my introductory remarks on the Order) are the sole Indian family belonging to the group *Mesomyodi*. In addition to the different structure of the syrinx, they are also distinguished from all other Indian Passerine birds by the formation of the wing. There are ten primaries, but the first, instead of being notably small, is almost as long as the second. Their long legs, very short tail, and beautiful

distinctive colouration also serve to render their identification easy. Pittas occur all over South-eastern Asia, being most numerous in the Malay Archipelago. Some species extend into Australia, while one is found in Africa. They all live on the ground, and are insectivorous. They can hop and run well. Most species are found in thick undergrowth, and many of them are more or less migratory. Only one form is found in Ceylon, and it occurs only as a migrant.

Pitta brachyura.

The Indian Pitta.

Pitta brachyura (Oates, Vol. II., p. 393); *Pitta coronata* (Legge, p. 687).

Description.—Forehead and crown yellowish-brown, divided in the centre by a slightly irregular black band, running back to the nape and bordered below by a narrow white band over the eye; a broad black band from the gape of the bill across the face and ear coverts, merging on the nape with the median black band; a few feathers below the eye whitish; back, scapulars, and upper rump green, the upper back more or less washed with light brown; lower rump and upper tail coverts shining turquoise-blue; tail black tipped with dull blue; lesser wing coverts shining turquoise-blue with a black patch where the wing joins the back; median coverts and innermost secondaries green; greater coverts green, the outer feathers washed with blue and with black bases; primary coverts black; primaries black with grayish tips and a white band across their bases; secondaries black with white tips and a broad border of bluish-green on the terminal half of the outer webs; chin, throat, and sides of neck up to the black band white; remainder of lower parts fawn colour; the middle of the abdomen, vent, and lower tail coverts scarlet.

Bill blackish, the ridge and basal part of lower mandible reddish-brown; iris dark brown; legs and feet flesh-colour.

Length about 7; wing 4·1; tail 1·7; tarsus 1·4; bill from gape 1·1.

Distribution.—A fairly common north-east monsoon migrant, arriving in October and leaving in April. It spreads all over the Island, but only occasionally visits elevations of over 5,000 feet. It occurs over practically the whole of India proper, but in many parts in the north and south of its range it is a seasonal migrant.

Habits.—A shy bird, which keeps to thick cover in undergrowth, secondary jungle, and thick woods. It may occasionally be seen in the evening flitting from one cover to another. Its presence is usually made known by its shrill rather pleasant call, which is uttered chiefly in the early morning and evening, and is well expressed by the vernacular names—*avichchiya* in Sinhalese and *ayitta* in Tamil. Birds on their first arrival on the west coast are much exhausted by their flight, and frequently take shelter in town gardens or even bungalows. Stray specimens occasionally loiter, and have been obtained during the south-west monsoon, but it is not likely to be found breeding in Ceylon.

Explanation of the Plates.

Plate I.

Fig. 1.—Parus major mahrattarum ; × $\frac{1}{3}$.

Fig. 2.—Molpastes hæmorrhous hæmorrhous ; × $\frac{1}{3}$.

Fig. 3.—Dissemurus paradiseus ceylonensis ; × $\frac{1}{5}$.

Fig. 4.—Lanius schach erythronotus ; × $\frac{1}{3}$.

Fig. 5.—Eulabes ptilogenys ; × $\frac{1}{5}$.

Plate II.

Fig. 1.—Acridotheres tristis melanosternus ; × $\frac{1}{4}$.

Fig. 2.—Merula kinnisi ; × $\frac{1}{4}$.

Fig. 3.—Munia malacca ; × $\frac{1}{2}$.

Fig. 4.—Alauda gulgula australis ; × $\frac{1}{4}$.

Fig. 5.—Zosterops ceylonensis ; × $\frac{1}{2}$.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

NEW CEYLON DIPTERA.

(Part II.)

By R. A. Senior-White, F.E.S.

Mycetophilidæ.

Ceroplatus pulchripennis, sp. n.

Male.—Head: Dark brown, palpi concolorous. Eyes widely separated below antennæ. Antennæ unicolorous, yellowish-brown, quite as flattened as in *C. quadripunctatus*, but with apical joint much more pointed.

Thorax: Yellowish-brown dorsally, a pair of ill-defined darker lines dorso-centrally converging posteriorly. Shoulders and pleuræ, whitish. Scutellum concolorous with dorsum, metanotum grayish-yellow. Sides of thoracic dorsum and scutellar margin with black bristles.

Abdomen: Grayish-brown, first segment half the width of the rest of the abdomen. Junctions and central area of dorsal surface of segments broadly paler, the whole with bristly black hairs. Genitalia, black, small.

Wings: Grayish, a darker area is bounded internally by a line from axillary angle over the cross veins, sharply angled outwards in upper half of marginal cell to costa, and contains a pale area between the third and upper branch of fifth veins centred over the inner third of petiole of fourth vein, and indefinite pale submarginal spots in second, third, and fourth posterior cells. The infuscation is most pronounced above upper branch of fifth vein internally to pale area in outer three-quarters of marginal and in submarginal cells. Halteres with pale yellow stem and large black capitellum.

Long: 2 mm.

Described from a unique male in good condition taken from a spider's web, Suduganga, Matale, Ceylon, February 17, 1920.

In my own collection.

It is a curious coincidence that the types of both the Asiatic species have come from spiders' webs, as also my only specimen of *C. quadripunctatus* (Brun.).

Platyura minuta, sp. n.

Male.—Head: Frons very dark brown, the lateral ocelli prominent, whitish. Palpi concolorous. Antennæ paler brown, considerably pubescent, apical joint appearing like a narrow acuminate tip to penultimate.

Thorax: Dark brown, unmarked, shoulders pale yellow. Pleuræ and scutellum slightly paler, metanotum dark, very steep. A row of dorsocentral bristles, sides of dorsum bristly, and some bristles on scutellar margin, all black.

Abdomen: Brownish, unmarked, bristly. Genitalia prominent, a pair of rather paler brownish two-jointed claspers, the basal joint broadened apically and rather longer than apical joint. Between the claspers can be seen a black plate with bifid apex.

Legs: Yellowish-brown, posterior coxæ darker.

Wings: Gray. Petiole of fourth vein nearly as long as its branches, base of upper branch of fifth vein evanescent. Halteres with yellow stem and darker capitellum.

Long: $1\frac{3}{4}$ mm.

Described from unique male taken on window, Suduganga, Matale, Ceylon, April 25, 1920.

In my own collection.

This species runs down to couplet 8 in Brunetti's Key to the Indian species in "Fauna India, Diptera Nemocera," and there separates on the unbanded abdomen.

Lygistorrhina asiatica, sp. n.

Male.—Head: Frons blackish, with pale hairs, ocelli yellow, distinct. Proboscis as long as hind femur, tubular, brownish-yellow, with short sparse pubescence. Palpi very small,

single-jointed, concolorous. Antennæ laterally compressed, of same width throughout, the apical joint about twice as long as the penultimate, brown, with pale pubescence on underside and longer hairs above.

Thorax: Very dark brown, scutellum and metanotum concolorous, pleuræ yellowish, metapleuræ meeting above as a fine yellow band at junction of metanotum with abdomen, thus sharply separating these two dark portions. Prothorax and humeri, viewed from above, appear as a yellow anterior margin to mesonotum. Thoracic dorsum with irregularly placed stiff black hairs, strongest on lateral and posterior margins, scutellum with a marginal row of hairs.

Abdomen: Black, dorsally and laterally, with bristly hairs throughout, also ventrally from middle of fourth segment to apex. Genitalia inconspicuous, black, with some hairs.

Legs: Coxæ and femora yellowish, fore coxæ and all trochanters darker, as are also all tibiæ and tarsi. Hind tibiæ with the apical spurs equal, and a row of short lateral spines.

Wings: Pale smoky-yellow. Subcosta ending in costa, which extends practically to apex of wing. Halteres with yellow stem and blackish capitellum.

Long: $2\frac{1}{2}$ mm.

Described from a unique male taken on window, Suduganga, Matale, Ceylon, on April 20, 1920.

Type in my own collection.

This species differs from Skuse's definition of his genus in several respects, viz., the palpi are undoubtedly present, Skuse stating "apparently absent." The antennæ are broader and of equal width throughout, but this may be a sexual difference, as Skuse's type is a female; the short lateral spines on the hind tibiæ are easily overlooked, but in my species are undoubtedly present. The terminations of the costal and sub-costal veins also differ, but I do not think that all or any of these differences requires the erection of a new genus.

RHYMOSIA VARICORNIS, sp. n.

Female.—Head : Frons yellowish, with decumbent fine black hairs. A row of black bristles around, but separated from, posterior orbits, the intervening space without hairs and thus appearing as a paler margin to the eyes. All three ocelli surrounded by a small blackish area. Face yellowish, palpi and proboscis rather more brownish. Eyes miscroscopically pale pubescent. Antennæ sixteen jointed. Scapal joints yellow, each with a ring of black setulæ apically, with two or three longer setæ above and below on first and above only on second joint. First four flagellar joints smooth, yellow, cylindrical, the first one and a half times as long as the second, constricted on basal third ; the next three equal, closely sessile. The remaining ten joints laterally compressed, dark brownish, pale pubescent; the first nine sub-equal, the apical half as long again as the penultimate.

Thorax : Yellowish, a pair of purplish-brown stripes from above the humeri widely separated anteriorly, converging posteriorly, enclosing a median V-shaped yellow area, with its apex above root of scutellum. Viewed from behind it is seen that the extreme posterior portion of the mesonotum, too steep to be viewed from above, is all yellow. Within the V-mark are a pair of ill-defined purplish brown lines, converging and terminating at about centre of mesonotum. Humeri and pleuræ yellow. Scutellum yellow, the whole of the dorsal surface, except a narrow median area, brown, as if the mesonotal subdorsal brown bands were continued on to it. Metanotum brownish-yellow. Mesonotum short black-haired, a line of sub-erect black bristles along each margin of the V-mark, ending posteriorly in a pair of diverging black bristles medianly above root of scutellum. Several strong black bristles around humeri, those above the calli more or less erect, two very strong ones below decumbent, and one or two strong bristles supra-alar and on postalar calli. A strong apical pair on scutellum.

Abdomen : Strongly laterally compressed, brownish-yellow, dorsum all black, except at base of first and second segments ; second to fifth segments laterally with broad posterior black bands. Venter and genital lamellæ yellow.

Legs: Coxæ and femora yellow, tibiæ slightly and tarsi much darker.

Wings: Yellowish-gray. Fork of fifth vein very narrow to beyond level of the fork of the fourth vein; sixth vein strong, extending as far as level of fork of fourth; seventh distinct, incomplete. Halteres yellow.

Long: 4 mm.

Described from unique female, in perfect condition, taken on window, Suduganga, Matale, Ceylon, August 1, 1920.

Type in my own collection.

DELOPSIS NIGRO-FLAVA, sp. n.

Female.—Head: Yellow, with paler pubescence. Antennæ and palpi concolorous. Eyes microscopically pale pubescent.

Thorax: Yellow, the dorsum with the posterior half or three-quarters with a broad black saddle-like patch of irregular outline, leaving only a narrow posterior yellow margin. Propleura yellow, remainder of sides of thorax brownish, hypopleura very dark to black. Scutellum and metanotum black.

Thorax with yellowish hairs and strong brownish-yellow bristles, situated as follows:—A long one on postalar calli, a prescutellar pair, several below wing roots, and about four on margin of scutellum.

Abdomen: Yellow. The dorsum of the first five segments from all black to black with yellow basal halves to third to fifth segments. The black colour more or less extended to lateral on posterior margins of segments.

Legs: yellow, paler than head and thorax, the tip of front coxæ usually more or less darkened.

Wings: Grayish, more yellow on fore border, veins yellowish. Halteres yellow.

Long: 3 mm.

Described from four specimens from Maskeliya in January and March and Matale in January (both Ceylon). Type from Suduganga, Matale, on window, January 29, 1920. Type and other specimens in my own collection.

Delopsis setosiventris, sp. n.

Female.—Head, palpi, and antennæ : Yellow, distal flagellar joints of last somewhat darker.

Thorax : Yellowish, an indefinite brown patch on posterior half of dorsum, pleuræ concolorous, slightly darker posteriorly, hypopleuræ very dark to black. Scutellum and metanotum very dark brown. Bristles of thorax yellow-brown, a single postalar, four prescutellar (two acrostichal, two dorsocentral), a few below wing roots, and four scutellar.

Abdomen : Dorsum brownish, extreme bases of segments very narrowly paler, posterior two-thirds of each segment occupied by an ill-defined blackish band. Sides and venter more yellowish, unmarked, On midline of venter, just before apex of second segment, a pair of straight decumbent hairs about as long as mid tarsal setæ, with a shorter, finer pair, slightly posteriorly directed, just posterior to the first pair.

Legs : Pale yellow, unmarked, the hind tibiæ with only two ranges of setæ.

Wings : Yellowish, also veins. Halteres pale yellow.

Long : $2\frac{3}{4}$ mm.

Described from two females taken in garden, Suduganga, Matale, Ceylon, on January 16 (type) and 23, 1920.

Both in my own collection.

The absence of the third row of hind tibial setæ, though contrary to a generic character, I am not prepared to make the cause of a new genus, as so few species are yet known.

Delopsis pectenipes, sp. n.

Male.—Head, palpi, and antennæ : Yellowish, the first with pale yellow pubescence, the last with flagellar joints rather darker with pale pubescence.

Thorax : Yellowish, an elliptical black spot medianly on anterior third of dorsum, not reaching front margin, continued posteriorly as a black stripe to hind margin. On each side

an admedian black stripe, broader than the median, inclined obliquely so as to coalesce with the latter on posterior third, terminating anteriorly before the level of the median spot, and incised on outer edge at level of wing roots. Pleuræ concolorous with dorsum, slightly darker posteriorly. Scutellum and metanotum black. Bristles dark brown, a postalar, acrostichal and dorsocentral prescutellar pairs, a vertical row of four on hind margin of mesopleuron, one or two on lower edge of pteropleuron and four scutellar.

Abdomen : Yellowish with paler hairs. Dorsum of first five segments gray. A pair of very small genital lamellæ are just visible.

Legs : Pale yellow, unmarked. Hind tibiæ with only two ranges of spines, but on inner side apically there is a comb-like fan of short spines set so closely together as to appear like a plate with dentate margin.

Wings and veins : Yellowish. Halteres paler yellow.

Long : $2\frac{1}{2}$ mm.

Described from unique male in perfect condition taken on window, Suduganga, Matale, Ceylon, on April 19, 1920.

In my own collection.

Delopsis ferruginea, sp. n.

Male.—Head : Yellowish-brown with paler hairs. Palpi and antennæ concolorous.

Thorax : Ferrugineous, pleuræ concolorous, scutellum with ferrugineous centre and black sides. A row of stiff yellow hairs along hind margin of dorsum and a covering of same on scutellum. Bristles brownish, a prescutellar row of six, a vertical row of five on hind margin of mesopleuron, four or five pteropleural, and four scutellar.

Abdomen : Yellow with paler hairs. Hind margin of first segment narrowly, of second to fifth broadly black, the bands extending laterally to edge of venter. Sixth segment wholly yellow. Genital lamellae (mostly concealed) yellow.

Legs: Pale yellow. Upper edge of fore coxæ, lower edge of mid femora, and upper edges and tips of posterior tibiæ infuscated. Hind tibiæ with a small apical comb on inner side.

Wings: Yellowish-grey, the first basal, and that portion of the subcostal cell above it, infuscated. Halteres pale yellow.

Long: 3½ mm.

Described from a unique male in perfect condition taken on window, Suduganga, Matale, Ceylon, on December 19, 1919.

In my own collection.

DELOPSIS FLAVOHIRTA, sp. n.

Male.—Head: Brownish-yellow, with pale yellow hairs. Palpi yellowish. Antennæ: scape yellow, flagellum brown.

Thorax: Blackish, yellow on fore margin, humeri, and obscurely on posterior corners of dorsum, the whole with stiff yellow hairs. Pleuræ and scutellum concolorous, with similar hairs. The usual six prescutellar bristles, two or three below humeri, a vertical row on posterior margin of mesopleuron, two or three pteropleural, and four scutellar, all brown.

Abdomen: Black with stiff pale yellow hairs, which are so thick at bases of second to fifth segments as to form distinct pale bands dorsally and laterally. Two brownish genital lamellæ, downwardly directed, are visible.

Legs: Pale yellow. Tips of all coxæ, of posterior femora and tibiæ, infuscated. A small apical comb on inner side of hind tibia.

Wings: Yellowish-gray, darker on foreborder basally. Halteres pale yellow.

Long: 3 mm.

Described from unique male in perfect condition taken on window, Suduganga, Matale, Ceylon, July 6, 1920.

In my own collection.

Bombyliidæ.

BOMBYLIUS BRUNETTII, sp. n.

Male, Female.—Head : In male nearly as broad as thorax, eyes black, contiguous for about half the distance from vertex to antennæ, upper facets considerably larger than lower, the line of division, which is not very clearly marked, occurring at about level of antennæ. Vertex distinct, elevated, ocellar triangle with long black hairs. Face black, shining, a patch of white scales at sides just above antennæ and another at level of mouth margin, which is dark brown. Sides of face and mouth with long black hairs. Antennæ cylindrical, third joint nearly as long as first and second together, the first joint with long black hairs. Palpi black with long hairs. Occiput black with narrow golden scales and long golden hairs mixed above with a few black ones.

In female the frons anteriorly nearly one-third width of head, narrowed by about one-third of this at vertex, black, with golden hair-like scales and some long black hairs, of which there is also a bunch on ocellar triangle. Face shining black, with patches of white scales and black hairs at sides as in male. Antennæ and palpi as in male, but some of hairs of latter, and those along mouth margin, are pale. Occipital hairs stouter, and all golden.

Thorax : Deep black in both sexes, with scattered golden hair-like scales thicker on anterior dorsal area and on pleuræ, the anterior third of dorsum with upright black hairs intermixed, stronger and more numerous in male. Above and in front of wing roots, and on mesopleuræ, a patch of white scales. Metapleuræ with a bunch of golden hairs. Some long black bristles on postalar calli, and on scutellar margin. Scutellum similar to mesonotum, but with the golden hair-like scales thicker around margin.

In female, in addition, there is a thin dusting of heliotrope flat scales behind wing roots and on disc of scutellum.

Abdomen : In male black, first segment with a big tuft of golden scales laterally, and a fringe of short golden scales

towards posterior margin. Second and third segments with black scales and posterior marginal bands of short golden scales apparently not extending to median area, and with thin patches of heliotrope scales laterally on anterior halves of the segments. Fourth to seventh segments covered with snow-white broad appressed scales, hind margins of each segment with a few long black hairs laterally. Venter black, with some golden hairs on posterior margins of segments and thin patches of heliotrope scales thicker towards sides than towards mid line. Genitalia concealed.

Female.—Abdomen: Black, a bunch of golden hairs on anterior margin laterally, posterior margins of first six segments with bands of golden hairs extending right across the dorsal surface, some black scales on the middle line of anterior half of second segment, the remainder dusted with flat heliotrope scales. Seventh segment black, with few heliotrope scales and no golden hairs, apically with many long black bristles. Posterior corners of each segment with a few long black hairs. A lateral spot of flat white scales on anterior margin of second and fourth segments. Venter as in male. Genitalia consist of an ovipositor, which has on each side a row of stiff, short, dark golden spines or bristles, outward and downward directed, the whole surrounded with a thick tuft of red-brown hairs, with some lateral paler, longer ones, which bend inwards apically to cover the whole.

[In no specimen of either sex is the abdomen entirely unrubbed.]

Legs: Black, thinly covered with appressed bluish scales so as to appear grey. Hind femora with a single row of black bristles below. All tibiæ bristly.

Wings: Deep smoky brownish-black, rather paler posteriorly, a black spot in upper corner of second basal cell, over first section of upper branch of fifth vein, and a black streak in extreme base of discal cell, the last two markings not easily visible in the darker specimens. The centre of all the cells with paler streaks, not always, but sometimes very noticeable. Halteres with brown stem and black capitellum.

Long: 4–7½ mm.

Described from eighteen males and twenty-one females from Matale, Opalgalla (intermediate dry zone), Habarana, Kanthalai, and Trincomalee (all Ceylon) in March, April, September, and October of various years. Type male from Trincomalee, October 8, 1919; type female from between Tamblegam and Trincomalee, October 6, 1919.

It was very common along the track from Opalgalla Village to the ford across the Ambanganga on two days in April, 1919.

This species is closely allied to *B. wulpii* (Brun.), but is easily distinguishable from it by the second thoracic white spot beneath the wings, the smaller extent of the male abdomen covered with white scales, and the entire absence of the fiery red scales of the female abdomen of the latter. Both species may occur together, as I took a solitary male of each species on Sober Island, Trincomalee, on October 9, 1919, but, so far as my Ceylon experience goes, the present species is by far the more common of the two. They are without a doubt the two most beautiful members of the genus in Peninsular India, and as the first commemorates the great Entomologist who laid the foundations of the modern study of Oriental Diptera, I feel I cannot do better than dedicate the present species to his successor, who, on van der Wulp's foundation, has raised the edifice of our present knowledge of the Indian dipterous fauna.

Scenopinidæ.

SCENOPINUS ZEYLANICUS, sp. n.

Male, Female.—Head: Black, in male the frons consists of an elevated ocellar triangle, from which runs a shining black line, separating the eyes, for over half its length, then gradually widening out to face. Mouth margin, face, and lowest part of frons as far as the junction of the upper and lower eye facets with white side margins. Antennæ dark brown, with pale pubescence visible in certain lights, third joint ligulate, $2\frac{1}{2}$ times as long as first and second together. Eyes over rather more than half their height with upper facets enlarged.

In female, frons about one-ninth of head width, with sides almost parallel throughout, except towards vertex, where it is somewhat widened to enclose the elevated ocellar triangle.

Sides and an impressed middle line smooth shining black, the remainder concolorous, roughened by transverse striations, with some very minute white pile visible in certain lights. Eye facets uniform in size. The white margin to mouth, face, and frons arising up latter about as far as in male. Otherwise as in male.

Thorax: In both sexes similar. Black, rugose, pleuræ and scutellum concolorous. Viewed from side, the humerus is surrounded by a fine line of white pubescence, which, broadened, runs inwards along anterior margin, but does not meet from each side on middle line. A small shining brown spot on posterior edge of humerus at commencement of suture.

Abdomen: Black. In male the third to fifth segments dorsally with white bands, that on third narrow, occupying only posterior margin, running almost from side to side of segment, on fourth and fifth much broader, occupying nearly the whole breadth of segment towards middle, but laterally narrowed anteriorly, thus making the shape elongate lunulate. The bands not extending quite so far towards the sides as on third segment. Genitalia large, black.

In female abdomen all black, the third to fifth segments with a median dorsal transverse impressed line.

Legs: Similar in both sexes. Femora and tibiæ dark brown, junction of mid femur and tibia paler. Tarsi whitish-yellow, slightly darkened at tip of each joint. Hind femora basally incrassate, hind tibiæ simple. The only noticeable pubescence is a fringe of hairs on mid femora.

Wings: Grayish, veins brownish. First posterior cell noticeably narrowed in margin. Lower branch of fourth vein usually not reaching margin, but anal vein does so. Halteres dull brown.

Long: Male, $3\frac{1}{2}$ mm.; female, 3–4 mm.

Described from a single male and eleven females, all taken on windows at Suduganga, Matale District, Ceylon, in months of January-March and May-August in various years. Type male on June 7, 1920; type female on July 18, 1920.

Types and other specimens in my own collection.

POLYZOA IN THE COLOMBO WATERWORKS.

By N. Annandale, D.Sc., B.A., F.R.S.E., C.M.Z.S.

IN the whole of the animal kingdom there are few groups less frequently associated with the activities of men than the Polyzoa, or, as some prefer to call them, the Bryozoa. Indeed, I know of only one point at which contact is commonly established, namely, the trouble caused in waterworks by the rapid proliferation and accumulation of the colonies of these animals. Numerous instances of this occurrence have now been reported from both Europe and Asia. Some years ago Harmer* collected and collated all the information then available as to European instances with much additional information of his own. When in Japan in 1915 I was shown specimens of a Polyzoon that was causing inconvenience in the pipes conveying the water of Lake Biwa to the city of Kyoto, and Dr. H. H. Marshall has recently submitted to me for identification masses of another species from the waterworks of Rangoon. Still more recently I have received through Mr. R. Kirkpatrick of the British and Dr. J. Pearson of the Colombo Museums examples of yet another species from the Colombo Waterworks.

The damage done by the Polyzoa is both direct and indirect. Their rapid growth tends to block up the pipes, their decay contaminates the water, and their moss-like colonies provide a suitable nidus for many other organisms, such as algæ, protozoa, sponges, minute worms of several kinds, insect larvæ, and even molluscs, which by their vital activities produce discolouration and bad odour in the water. In many cases several different kinds of Polyzoa are present together in the pipes, but in those I have seen in Asia there has been only one species. In Japan it was a *Paludicella*, in Rangoon the cosmopolitan *Plumatella emarginata* (phase *benedeni*), and in Ceylon *P. longigemmis*, a form described by myself from Peninsular India.

* "The Polyzoa of Waterworks," *Proc. Zool. Soc., London*, 1913; pp. 426-457.

PLUMATELLA (HYALINELLA) LONGIGEMMIS Annandale.

1915 : *Plumatella punctata* var. *longigemmis*, Annandale, *Rec. Ind. Mus.*, XI., pp. 166, 168, fig. 2, pl. iii., fig. 2.

1919 : *Plumatella* (*Hyalinella*) *longigemmis*, *id.*, *ibid.*, XVIII., p. 94.

The original specimens of this species were found adhering to rocks in a small pond of slightly brackish water on an island in the Chilka Lake on the east coast of India. Until its discovery in the Colombo Waterworks it had not been found anywhere else.

The comparatively small samples sent me from Colombo look at first sight very different from the type specimen with which I have compared them. The latter is adherent throughout, and its component parts are relatively short and stout and flattened where in contact with the stone to which it is attached. The former seem to have floated free in the water, and were probably attached only at the base of the colony, which consists of elongate, slender, cylindrical stems and branches, more or less entangled together, and forming masses comparable to those formed by many filamentous algæ. The internal structure of the different examples is, however, the same, and the shape and proportions of the statoblasts (resting buds) is practically identical—a very important specific character in *Plumatella*.

In the masses of this species from the Colombo Waterworks I find numerous specimens of more than one species of Oligochæte worms, and also larvæ of the Culicid genus *Chaoborus*. The colonies themselves are covered with Vorticellid protozoa.

The fact that *P. longigemmis* has been found in slightly brackish water is, perhaps, of some practical importance, as Harmer recommends a weak solution of common salt as a destructive agent for Polyzoa in waterworks.

Mode of Occurrence.

Dr. L. F. Hirst, Bacteriologist to the Colombo Municipality, writes as follows :—

" Colombo is supplied with water from an artificial lake, 28 miles from the city. Prior to the installation of the mechanical

filters at Labugama in 1917, large masses of Polyzoa were constantly observed coming over the spill into the Maligakanda service reservoir. I forwarded specimens to Dr. S. F. Harmer in 1915. He identified them as *Fredericella indica* (Annandale). Only small fragments of Polyzoa and their statoblasts are now found in this water. On April 17, 1920, the level of Labugama Lake rose suddenly after heavy rain from an exceptionally low mark. Considerable quantities of Polyzoon moss appeared in the water on that particular day and were carried on to the filters. This appearance has never been observed either before or since that date. I forwarded specimens taken from the surface of the filters to the British Museum. Sir Sydney Harmer being unable to identify them from Museum types forwarded them to Dr. Annandale. Another piece of the same preserved material was sent direct to Dr. Annandale from Colombo. In August, 1920, a similar Polyzoon, in a partial state of decomposition, was removed from the walls of the wash-water tank at the filtration works. This ferro-concrete tank is uncovered, partially exposed to sunlight, and about 3 feet deep. Fresh filtered water is pumped through it daily. The Polyzoa formed a continuous coating below the water level. The growth had developed in a period of seven months."

NOTES.

*A new Arhopala (Lep: Lycænidæ) from Ceylon.**—In a small collection of *Lycænidæ* recently received from Mr. W. Ormiston from Ceylon there is, amongst other interesting forms, a pair of an *Arhopala*, which Mr. Ormiston considered new. After a fairly careful search I have been unable to find any published description with which it agrees, and have therefore come to the same conclusion. In such a well-worked country as Ceylon, one would hardly have expected such a distinctive species of this showy genus to have been overlooked so long. Its discovery therefore may, I hope, be an earnest of many more yet to be made known.

Arhopala ormistoni, sp. n.

Arhopala, sp. nov., Ormiston, "Notes on Ceylon Butterflies," Vol. XI., Part 40, Part I., p. 58, in "Spolia Zeylanica," 1918.

♂. *Upper Side.—Both wings* uniformly deep rich violet-blue. *Fore-wing* with costa and hind margin narrowly black, widest at apex; *hind-wing* with costa and inner margin broadly, hind margin narrowly, dark brown.

Under Side.—Fore-wing: Ground colour light gray-brown with a faint vinous tinge, areas 1*a*, 1*b*, and 2 centrally and for the greater part very pale shiny gray-brown, cell and remainder of wing surface thickly sprinkled with gray; a small circular spot near base of cell, a larger oval spot in centre, and a still larger one at end of cell, all much darker brown and ringed with white; a discal band of six similar subquadrate spots, interrupted at vein 4, the lowest (in area 1*b*) very indistinct, a similar oblong spot at base of area 2 lying along vein 2, an indistinct oblong pale brown mark in 1*b* just before base of vein 2 and in line with central cell spot. A submarginal row of brown lunules edged both sides with whitish, largest and most distinct posteriorly. There are indications of two small

* Reprinted from "The Entomologist," Vol. LIII, p. 97, May, 1920.

costal spots, similar to the cell spots, in areas 9 and 10. *Hind-wing :* ground colour similar, but, together with the markings, almost entirely obscured by very heavy ashy-gray scaling. The most distinct markings are the three small dark brown white-ringed basal spots in the cell and areas 1*c* and 7, the larger one in centre of cell, the triangular one in centre of 7, and the two squarish ones in 6 and 7, these last being the uppermost spots of the discal band. The remainder of the discal band is represented very obscurely by the outer edge of the spots only, forming a very much broken wavy semi-circular row of short curved dark lines. There is the outline of a long oval spot across cell end, and indications of three or four small spots between it and the inner margin. A small black spot is present at the anal angle, and another just to side of base of tail in area 2, both bordered proximally with metallic blue scaling, which is also present marginally in two small patches between these spots.

Head dark brown with a small white spot between the antennæ ; the eyes, except dorsally, ringed with white ; palpi white, the third joint and half the second dorsally and laterally only, brown. Thorax, above, covered with longish bronze-green hairs ; below, white. Body dark brown, ventrally pale-buffish.

♀. Both wings above uniformly dark smoky-brown, with no trace of blue or bluish reflections. Otherwise exactly similar to the ♂.

Length of fore-wing, ♂ 2·0 cm., ♀ 1·9 cm.

B.M. Types No. Rh. 061 (♂) and 062 (♀) from Nakiadeniya, 16 miles from Galle, South Ceylon, IV., 17, W. Ormiston.

Several other specimens in Coll. Ormiston.

This species seems to be nearest to *A. alitœus*, Hew., and *A. mirabella*, Doherty, but it can at once be separated from any Indian *Arhopala* known to me by its ashy-gray underside and plain brown female.

Natural History Museum, N. D. RILEY.
South Kensington, March 12, 1920.

*A LIST OF LEPIDOPTERA NOTED TO ATTACK CULTIVATED PLANTS IN CEYLON.**

Nymphalidæ.

Neptis eurynome. *Canavalia gladiata, Vigna catjang*
Melanitis ismene. *Sorghum, Panicum maximum.*
Danais plexippus. *Stephanotis* sp.
(U. R. 3.) *Ficus parasitica, Carissa carandas.*†
Telchinia violæ. *Passiflora fœtida.*

Papilionidæ.

Papilio demoleus. *Citrus* spp., *Feronia elephantum.*
Papilio agamemnon. *Anona muricata.*
Papilio pammon. *Citrus* spp., *Murraya kœnigii.*
Papilio parinda. *Citrus* sp.
Papilio aristolochiæ. *Aristolochia* sp.

Pieridæ.

Terias hecabe. *Cassia fistula.*

Lycænidæ.

Catochrysops cnejus. *Vigna catjang.*
Jamides bochus. *Vigna catjang.*
Chilades laius. *Feronia elephantum.*
Spalgis epius. *Pseudococcus* sp. on *Solanum sp.*

Hesperiidæ.

Hesperia galba. *Hibiscus* sp. (hollyhock).

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* Reprinted from the Report of the Proceedings of the Third Entomological Meeting held at Pusa, 1919.

† Where no name is given the reference is to the cage slip for future identification. This collection, except Sphingidæ and Micro-lepidoptera, is now in the Colombo Museum, (R.S.-W.)

EUPTEROTIDÆ.

EUPTEROTE GEMINATA. *Erythrina indica, Theobroma cacao, Cajanus indicus.*

SPHINGIDÆ.

RHYNCOLABA ACTEUS. *Calladium* vars.

CHÆROCAMPA THEYLIA (VINACEA).* *Balsamifera impatiens;* very bad in November only.

CHÆROCAMPA THEYLIA.† "*Pach-arisi-pillu*" (Tamil).

NEPHELE HESPERA. *Carissa carandas.*

DEILEPHILA NERII. *Vinca* sp., Oleander spp.

ACHERONTIA LACHESIS. *Erythrina indica, Solanum melongena, Capsicum* spp.

ACHERONTIA STYX. *Solanum melongena.*

HERSE CONVOLVULI. *Vigna catjang.*

NOTODONTIDÆ.

STAUROPUS ALTERNUS. *Cajanus indicus.*

SYNTOMIDÆ.

SYNTOMIS PASSALIS. *Phaseolus vulgaris, Capsicum* spp. Kohlrabi, Daisy vars, *Trichosanthes anguina.*

SYNTOMIS CYSSEA. *Ipomœa rubro-cœrulea.*

THYRIDIDÆ.

DYSODIA IGNITA. *Croton aromaticus.*

LASIOCAMPIDÆ.

SUANA CONCOLOR. *Psidium guyava, Cajanus indicus, Hibiscus rosa-sinensis.*

LIMACODIDÆ.

ALTHA LACTEOLA. *Carissa carandas.*

THOSEA CANA. Rose.

NAROSA CONSPERSA. *Feronia elephantum.*

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* The species here referred to as *C. theylia* (*vinacea*) is presumably *Hippotion rafflesi.* Butl. (See Roths and Jordan, *Revis Spling.*, p. 755.) —*Editor.*

† The species here referred to as *C. theylia* is presumably *Hippotion bœrhaviæ,* Fab. (vide *loc-cit,* p. 756). The true *Sphinx theylia* of Linnæus is a South American *Xylophanes.*—*Editor, Entomological Meeting.*

Lymantriidæ.

Dasychira fusiformis. *Pelargonium* vars, *Canna* sp., *Citrus* sp., rose, *Vigna catjang*, *C. carandas*, Kohl-rabi, *Solanum melongena*, *Phaseolus mungo*, *Cajanus indicus*, *Antigonon* sp., *Moringa pterygosperma*.

Dasychira divisa. Daisy vars, Amaryllid lily.

Dasychira mendosa. *Vigna catjang*.

Dasychira horsfieldi. *Vigna catjang*.

Dasychira sp. (? mendosa). *Solanum melongena*, *Citrus* sp., *Acalypha* sp.

Lymantria ampla. *Pelargonium* vars, *Theobroma cacao*, *Begonia* sp., *Carissa carandas*, rose, *Quisqualis indica*, *Cajanus indicus*.

Orgyia postica. *Pelargonium* vars, *Erythrina lithosperma*, *Vigna catjang*, *Canna* sp., *P. gratissima*, *Cajanus indicus*, *Solanum melongena*, mangosteen.

Lælia exclamationis. *Canna* sp.

Euproctis scintillans, Rose, Daisy vars, *Capsicum* sp., *Cajanus indicus*.

Euproctis fraterna. *Citrus* sp., *Feronia elephantum*, *Pelargonium* vars, *Solanum melongena*, rose, *Hibiscus rosa-sinensis*.

Euproctis semisignata. *Quisqualis indica*.

Psychidæ.

Acanthopsyche cana. *Hevea brasiliensis*.

A. punctimarginalis. Bred on Algæ on bamboo.

(AO. 2.) *Anona muricata*. Failed to rear out. Bad pests.

(PO. 2.) *Antigonon* sp. Failed to rear out. Bad pests.

Clania crameri. *Cajanus indicus*.

Arctiidæ.

Estigmene lactinea. Onion, kohl-rabi, beet.

Pericallia ricini. *Solanum melongena*, *Phaseolus vulgaris*, *Colocasia* sp., *Oleander*, kohl-rabi, rose, *Cajanus indicus*, mustard, *Momordica charantia*, *Luffa acutangula*.

Pisara lucidalis. *Carissa carandas*.

Selca plagiola. *Solanum melongena.*

Nyctemera lacticinia. *Vernonia emeria.* Feeds mainly on seed heads.

Noctuidæ.

Glottula dominica. *Amaryllis* spp.

Polytela gloriosæ. *Amaryllis* spp., *Gloriosa superba.*

Plusia. (Co. 6). Daisy vars. (*? P. limbirena*).

Plusia orichalcea. Kohl-rabi, carrot, *Pimpinella anisum.*

Plusia agramma. *Trichosanthes anguina.*

Plusia chalcytes. Onion, *Zinnia*, *Solanum melongena*, dahlia.

Plusia obtusisigna. *Coleus* sp.

Cosmophila indica. *Hibiscus* sp. (hollyhock), *H. rosa-sinensis.*

Achæa melicerte. Rose.

Ophiusa coronata. *Quisqualis indica.*

Plotheia nephelotis. *Solanum melongena.*

Chloridea obsoleta. *Pelargonium* vars, *Dianotus* sp., *Canna* sp. *Hibiscus esculentus.*

Chloridea assulta. *Physalis peruviana.*

Prodenia litura. *Solanum lycopersicum*, *S. melongena*, *Capsicum* spp., *Petunia*, onion, cabbage, carrot, beet, *Balsamifera impatiens*, *Zinnia*, *Canna* sp., *Gossypium* sp. (Cambodia), *P. gratissima*, *Dioscorea* sp., *Colocasia* sp., mustard, *Pelargonium* vars, *Hibiscus esculentus*, *Momordica charantia*, *Begonia* vars, *Phaseolus vulgaris*, *Vigna catjang.*

Eublemma olivacea. *Solanum melongena.*

Eublemma scitula. Pseudococci on *C. carandas.*

Acontia transversa. *Hibiscus esculentus*, *Hibiscus* sp. (hollyhock).

Euplexia opposita. Carrot, Daisy var.

Panilla albopunctata. *Polyporus zonalis* (hymenium surface only.)

Amyna selenampha. *Croton aromaticus.*

Hypena cognata. *Lantana.*

Lacera alope. *Cæsalpinia sappan.*

Earias chromataria. *Hibiscus* sp. (hollyhock).

Earias fabia. *Hibiscus esculentus.*

Remigia frugalis. *Panicum maximum.*
(Z. A. 3.) *Hirneola hispidula.*
Beara dichromella. *Hibiscus rosa-sinensis.*

Geometridæ.

Craspedia fibulata. Kohl-rabi, *Petunia, Dendrobium macarthiæ, Calanthe vestita, Pimpinella anisum,* spinach.
Craspedia remotata. *Gnaphalium* sp. "*Ponnandey Kirey*" (Tam.) garden edging plant.
Hyposidra talaca. *Salvia* sp., *Peltophorum ferrugineum, Canna* sp. *Zinnia* sp., rose, *Solanum melongena, Cæsalpinia sappan, Vigna catjang.*
Gymnoscelis albicaudata. *Hibiscus* sp. (hollyhock).
Thalera caudularia. *Antigonon* sp.
Boarmia acaciaria. *Cassia fistula.*
Boarmia bhurmitra. *Solanum melongena, Capsicum* sp.
Pseudoterpna chlora. *Cajanus indicus.*
Cidaria cingala. *Balsamifera impatiens.*
Nemoria integranota. *Cajanus indicus.*
Thalassodes veraria. Rose.

Pyralidæ.

Hymenia fascialis. *Celosia* sp., beet.
Hellula undalis. Kohl-rabi, turnip, cabbage, mustard.
Glyphodes bivitralis. *Ficus religiosa, F. glomerata.*
Glyphodes indica. *Trichosanthes anguina,* melon vars.
Terastia meticulosalis. *Erythrina lithosperma.*
Sylepta derogata. *Hibiscus esculentus, Hibiscus* sp. (hollyhock,) *H. rosa-sinensis, Gossypium* sp. (Cambodia).
Lepyrodes geometralis. Jasmine.
Nephopteryx minutella. *Solanum melongena.*
Crocidolomia binotalis. Kohl-rabi, cabbage, mustard, *Capsicum* sp.
Myelois pectinicornella. *Theobroma cacao.*
Epicrocis lateritialis. *Beleropone* sp.
Pachyzancla ægrotalis. *S. melongena, S. indicum ?*
Nacoleia indicata. *Anona muricata.*
Maruca testulalis. *Phaseolus vulgaris* vars.

Leucinodes orbonalis. *Solanum melongena.*
Dichocrocis punctiferalis. *Sorghum* (in heads).
Lygropia quaternalis. "*Damunu*," Singhalese (? Malvaceæ.)
Euzophera perticella. *Solanum melongena.*

Tineina.

Plutella maculipennis. Turnip, cabbage, mustard.
Gelechia gossypiella. *Gossypium* sp. (Cambodia).
Comocritis pieria. *Hevea brasiliensis.*

Tortricidæ.

Adoxophyes privatana. *Cajanus indicus.*
(CO. 4.) Dahlia.

Pterophoridæ.

Sphenarches caffer. *Pelargonium* vars, *Theobroma cacao.*
Steganodactyla concursa. *Lantana, Passiflora fœtida.*

R. SENIOR-WHITE.

Stridulation in the Leaf-Insect.

(*With one Plate.*)

Pulchriphyllium crurifolium, Serv.—Stridulation appears to be little known among the *Phasmidæ*, and I have not been able to find any reference to this phenomenon in the somewhat scanty literature to hand. It is not mentioned in the Cambridge Natural History account of these insects, and therefore the following account of a sound-producing organ in certain species of leaf-insects may be of interest.

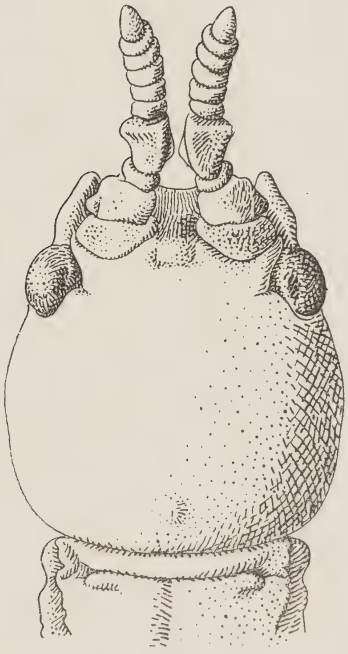
The organ in question is situated on the third antennal joint in the female insect. The antennæ in this sex are short, stout structures consisting of nine joints, which can be discriminated into a basal peduncle of three joints and a

"flagellum" of six. The third basal joint is roughly tetrahedral in shape, the apex of the tetrahedron being inserted in the distal cavity of the second joint. The "flagellum" springs from the base of the tetrahedron (which is distal to the insect's head). The medial face of the tetrahedron is the largest, and bears the stridulating apparatus. The two antennæ approach each other (when stridulation is taking place) from their bases, so that these large faces can be apposed, and the two flagella are normally held parallel to each other and nearly touching—projecting in front of the head.

Along the distal half of the dorsal edge of each of these opposing faces, there is a sharp ridge with its edge minutely serrated, and from nearly the distal end of this ridge a curved line of small tubercles, set on a slightly raised mound, runs ventrally and posteriorly almost along the distal and ventral boundaries of the face. Thus, the relation of the sharp ridge to the row of tubercles is almost that of a radius to an arc of its circle. It is hoped that the figures will make this clear.

The act of stridulation is performed by moving the two antennæ respectively up and down (in a dorso-ventral direction), so that the opposing faces of the third joints rub against each other—the ridge of one scraping against the row of tubercles of the other and *vice versâ*. By this means a sound is produced, but it is exceedingly feeble, and one has to hold the insect quite close to the ear in order to hear it at all. The only thing to which I can liken it is (on a very microphonic scale) the sound made by water dripping rapidly, but fairly regularly, from a rain spout on to the surface of an umbrella. As to what purpose it serves in the insect's economy, I am unable to offer any suggestion other than that it is probably designed to frighten possible enemies. It is conceivable that a bird (say) which had by some possibility succeeded in penetrating the insect's disguise and had seized it, might be induced to let go on hearing the weird sound, which would probably sound much louder to a bird, holding the insect in its beak, than it does to us. I am inclined to think, however, that the real enemies of leaf-insects are not birds and lizards, &c., which hunt almost exclusively by sight, but creatures

Fig. 1.



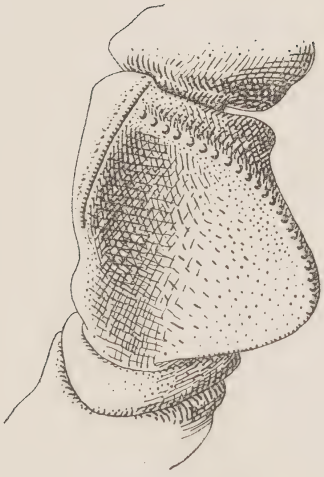


Fig. 2.

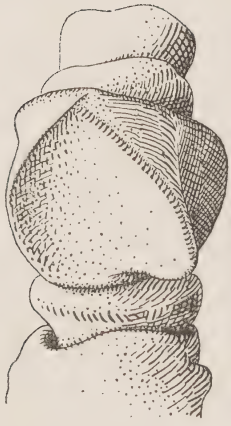


Fig. 3.

Pulchriphyllium crurifolium.

with subtler means of finding their prey, such as red ants. If this be so, the stridulation can hardly be much of a protection. I would like to meet the red ant that could be scared off by a little noisy bluff!

The best way to induce the "music" is to hold the insect by the pro-thorax, when its antennæ will almost certainly be put in action.

The apparatus is well developed even in the newly-hatched nymphs, and they can produce a sound which is just detectable by human ears. Unfortunately there are no male specimens available for examination at the time of writing, but I anticipate that the apparatus will be found to be present in them up to the last nymphal instar, after which the antennæ assume a very different form from those of the female.

The single specimen of *Phyllium athanysus*, Westw., in our collection, clearly shows a similar apparatus, but on a much finer scale than that of *P. crurifolium*. As I have never seen a living specimen of this very rare species, I am unable to describe its musical powers.

The fact that *P. crurifolium* produces a sound, by means of its antennæ, was first brought to my notice by Mr. C. Solomons, and on examining the antennæ microscopically the curious apparatus described was discovered.

Explanation of Plate.

Fig. 1.—Head of *Pulchriphyllium crurifolium*. × $5\frac{3}{4}$.

Fig. 2.—Third joint of left antenna of *P. crurifolium*, showing stridulating apparatus. × 26.

Fig. 3.—Third joint of left antenna of *Phyllium athanysus*, showing stridulating apparatus. × 26.

N.B.—In figs. 2 and 3 the dorsal aspect is to the left of the figures.

G. M. HENRY.

PROCEEDINGS OF THE CEYLON NATURAL HISTORY SOCIETY.

Thirty-third General Meeting.

THE Thirty-third General Meeting of the Society was held in the Colombo Museum Reading Room on Friday, November 26, 1920, at 9.15 P.M. The Hon. Sir Graeme Thomson, K.C.B., in the Chair.

A lecture entitled "Our Food from the Waters" was given by Dr. Joseph Pearson, D.Sc., F.R.S.E., F.L.S. Dr. Joseph Pearson explained a number of interesting exhibits.

Thirty-fourth General Meeting.

The Thirty-fourth General Meeting of the Society was held in the Colombo Museum Reading Room on Wednesday, January 12, 1921, at 5.15 P.M. Dr. Joseph Pearson in the Chair.

Forty-three new members were elected.

A paper entitled "Some useful Trees and Plants about Colombo" was given by Mr. Lewis.

Ninth Annual General Meeting.

The Ninth Annual General Meeting of the Society was held in the Colombo Museum Reading Room on Wednesday, March 9, 1921, at 5.15 P.M. Mr. W. E. Wait in the Chair.

The accounts and the reports of the Honorary Secretaries and Treasurers for 1920 were read and confirmed.

The following Office Bearers were elected for the ensuing year:—

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His Excellency the Governor.

President.

Sir Graeme Thomson, K.C.B.

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Dr. A. Nell.

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W. W. A. Phillips, Esq.	C. T. Symons, Esq., B.A.
	F. Lewis, Esq.

Honorary Secretary and Treasurer.

A. H. Malpas, Esq.

New Members: Mrs. J. Kubli and Messrs. Dennis Wood and W. W. Beling.

Mr. G. M. Henry exhibited some interesting specimens of insects, which he explained in detail.

Dr. Joseph Pearson exhibited and explained specimens of mother-of-pearl.

Thirty-sixth General Meeting.

The Thirty-sixth General Meeting of the Society was held in the Colombo Museum Reading Room on Tuesday, May 31, 1921, at 5.15 P.M. Dr. Joseph Pearson in the Chair.

New Members: Miss U. P. Buckmaster, Messrs. T. E. Tunnard, J. W. Nagel, and Dr. C. H. O. Senanayaka.

A paper entitled "How to collect Insects" was read by Mr. G. M. Henry. Mr. F. E. Mackwood gave a demonstration of photographs illustrating jungle life.

Mr. Henry explained a collection of interesting exhibits.

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THE COLOMBO MUSEUM,

CEYLON.

EDITED BY

JOSEPH PEARSON,

D.Sc. (Liverpool), D.Sc. (Manchester), F.R.S.E., F.L.S.,

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Smithsonian Institution
JUL 20 1923
National Museum.

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1923.

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VOL. XII.—PART 46. MAY 30, 1923.

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DESCRIPTIONS OF SOME NEW CARABIDÆ FROM CEYLON.

(Part I.)

By H. E. Andrewes.

THE Colombo Museum having sent me for determination a considerable collection of Carabidæ, it occurred to me, while studying them, that it would be useful to publish a complete Catalogue of all the species known from the Island. As a preliminary to this I am publishing here the descriptions, not only of the new species contained in the Museum collection, but also of such as I have been able to find in the British Museum, the Hope collection at Oxford, and in my own collection. For their kind assistance in placing material at my disposal I have to thank Professor Poulton and Dr. Gahan, and for getting together the Ceylonese specimens in the British Museum I am also indebted to Mr. G. J. Arrow. I have further, through the courtesy of Dr. Gestro and Dr. Horn, been able to examine the Ceylon collections in the Genoa Museum and the German Entomological Museum in Berlin. As a result, I describe in this paper one new genus and twenty-three new species, and in addition I am re-describing the genus *Anomostomus* of Laferté, rather imperfectly characterized by its author, and now recorded for the first time from the East. Many of these new species also occur on the mainland of India, but a fair number, so far as our present knowledge goes, are confined to Ceylon.

Of the species described from the material of the Colombo Museum, I have, at the request of the Director, handed the types of the following to the British Museum :—*Distichus uncinatus*, *Psilus porphyreus*, *Disphæricus myrmex*, *Oodes taprobanæ*, *Oodes xanthochilus*, and *Abacetus henryi*. By his kindness I have been allowed to retain in my own collection the types of *Craspedophorus halyi* and *Euplynes marginatus*. Dr. Horn has also been good enough to allow me to retain the types of *Clivina mustela*, *Gnophodes pearsoni*, and *Microlestes demessus*.

I must not omit to tender my thanks to Dr. Pearson, the Director, and to Mr. G. M. Henry for enabling me to study the interesting collection at Colombo.

Coptolobus latus sp. nov.

Length : 16·5—20·0 mm. Width : 4·8—6·3 mm.

Black : antennæ, palpi, and tarsi more or less piceous.

Head (5·0 mm. wide) rather flat, quadrate, with the front corners obliquely truncate, eyes moderately prominent, genæ oblique, projecting very little less than eyes, antennæ reaching base of prothorax, joint 2 a little longer than 3, terminal joints longer than wide, mandibles rather feebly bicarinate above, elongate, curved, right with a broad tooth, left with a deep indentation at middle, and below it a broad tooth, both slightly toothed near apex, front with two shallow, linear, parallel impressions, on the outer side of which are some very vague striæ ; surface smooth and shiny. *Prothorax* transverse (4·0 × 5·75 mm.), convex, apex slightly and widely emarginate, sides and base with narrow reflexed border, though well-marked marginal channel, especially along base, almost circular in shape, with truncated apex, middle of base very slightly flattened, front angles not rounded, but not projecting, no sign of tooth at hind angles, which have completely disappeared, a seta on each side at front angle, and a second one just below it, a third one behind ; median line clearly marked, not reaching extremities, front transverse impression faint, hind one wanting, basal foveæ very small and faint, surface smooth and shiny. *Elytra* (5·75 × 8·50 mm.) moderately convex, with rounded sides, widest at about middle, a narrow reflexed border, which is dilated at shoulder, but hardly forms a tooth, base emarginate ; 8-striate, the striæ fine, with occasional traces of punctures only, not obliterated towards apex, intervals flat on disk, rather convex at sides, especially near shoulder, 3 with four setiferous pores, one not far from base, the other three towards apex, 9 with a series of umbilicate pores and minute, elongate tubercles ; surface smooth, but less shiny than head and prothorax, base tuberculate and rugose. Beneath the body is smooth, the head a little punctate at base.

The species seems intermediate between the two sections of Chaudoir's Monograph, and is about the size and shape of *C. glabriculus* Chaud. From this, it is at once distinguished by the deeper striation of the elytra ; genæ less prominent, prothorax narrower, its margin forming a more regular arc, the apex less emarginate, base of elytra, beyond the row of tubercles, to some extent at least, rugose, tubercles of the marginal series larger, more elongate, and closer together.

Ceylon : 5 ex. Type in the British Museum. An example in the Colombo Museum from Bulutota has deeper and distinctly punctured striæ, with the shoulders very obviously dentate ; nevertheless, it agrees so well with the typical form in other respects that I think it belongs to the same species. There are two examples from Mr. T. G. Sloane's collection ; one of these is unusually smooth and shiny, the legs reddish, the base of the mandibles (which are very widely opened) is yellowish and translucent, the basal tooth in both mandibles very jagged ; the second example, labelled "Bilihul-oya (I. Z. Kannegieter)," is smaller than all the other specimens, the shoulders of the elytra are almost dentate, the intervals distinctly convex and the striæ finely punctate.

Distichus uncinatus sp. nov.

Length : 12—13 mm. Width : 3·1—3·3 mm.

Black : head and prothorax shiny, elytra dull, shagreened.

Head (3·0 mm. wide) quadrate, anterior angles obliquely cut away, frontal impressions linear, fairly deep, divergent behind, a few striæ on each side between them and the eye, neck with a faint and rather finely punctured constriction, clypeus dentate at each side of labrum, mandibles short, carinate, eyes moderately prominent, antennæ reaching base of prothorax, surface minutely and almost imperceptibly punctate. *Prothorax* (2·8 × 3·3 mm.) transverse, convex, base very slightly produced in middle, apex faintly emarginate sides finely bordered, parallel, front angles a little rounded, not prominent, a pore and seta just below them and another at hind angle, which is in the form of a slight and inconspicuous tooth ; median line and front transverse impression rather fine, but sharply incised, basal foveæ obsolete, their site

finely rugose, surface (like that of the head) very minutely punctate. *Elytra* (3·3 × 6·6 mm.) rather flat, nearly parallel, but very slightly dilated behind, a small but distinct hook-like tooth at shoulder; very finely striate, the striæ finely punctate (very much as in *Scarites punctum* Wied.), intervals flat, slightly convex near shoulder, three pores on stria 3, at a fourth, three-fourths, and close to apex, marginal channel finely, base more coarsely rugose.

Beneath the body is smooth in the middle, head punctate, sides and last ventral segment very finely rugose-punctate.

Rather larger than *D. puncticollis* Chaud, the frontal foveæ with a well-defined linear impression, head much less punctate, eyes larger, joints of antennæ longer; base of prothorax not punctate, but faintly rugose over a very small area; elytra much more finely punctate-striate.

Ceylon: Hambegamuwa, 3 ex. Type in the British Museum; cotypes in the Colombo Museum and in my collection.

Clivina mustela sp. nov.

Length: 4·0—4·25 mm. Width: 1·0 mm.

Dark chestnut red, elytra piceous with reddish border and suture, first two joints of antennæ, palpi, and tarsi testaceous.

Head smooth, vertex flattened, clypeus finely bordered and faintly emarginate in middle, wings rounded, a little behind median part, and separated from it by a deep notch, on the outer side separated by an equally deep notch from the frontal plates, which are rather small and with outer margin obliquely truncate, suture clearly marked, but not deep, lateral grooves deep in front, rather shallow behind, going straight back to the neck constriction, which is interrupted in middle, mandibles short, eyes prominent, the slightly developed genæ meeting the neck behind at a right angle, palpi elongate, slender, antennæ moniliform, incrassate. *Prothorax* convex, parallel (though faintly sinuate at apical third), as long as wide and a little wider than head, base strongly bordered, apex truncate, the front angles distant from neck, and projecting a little forwards, sides bordered, a well-marked tooth at hind angles, front transverse impression reaching border, median line very distinct, basal impressions

obsolete, surface smooth. *Elytra* cylindrical, nearly parallel, though very slightly narrowed towards base, hardly wider than prothorax, a little more than twice as long as wide, base truncate; striæ fairly deep, crenulate, 2–6 disappearing just before apex, 5 joining 6; at base 1–4 are free, 6 joins 5, and 7 joins 6 at some little distance from base, intervals smooth, 3 with four very large equidistant setiferous pores, 8 carinate at both extremities. Prosternal process narrow in front. Last ventral segment with two adjacent setæ on each side. Front femora widely dilated, emarginate beneath near apex; front tibiæ not grooved, 4-digitate (including apical prolongation), basal digitation very short; intermediate tibiæ with a long spine at some distance from apex.

Evidently allied to Putzeys' *lobata* group, but smaller than any species described by him, differing also in colour, and in the absence of groove on the front tibiæ.

Ceylon: Anuradhapura (Dr. W. Horn), 2 ex. The type is in my collection; cotype in Deutsch. Ent. Mus.

PSILUS PORPHYREUS sp. nov.

Length: 2·3 mm. Width: 0·9 mm.

Dark red, shiny: antennæ, palpi and tarsi testaceous yellow.

Head elongate, eyes not prominent, behind them a slight constriction, neck tumid, labrum short, truncate, clypeus truncate in front, the suture deep, the frontal plates forming small rounded bosses, between which and middle of clypeus are deep furrows, which diverge outwardly behind and are carried round the inner margin of eyes, surface smooth, antennæ moniliform, reaching base of prothorax, pubescent from near base of joint 2, which is considerably longer than the other joints. *Prothorax* very convex, nearly twice as wide as head, and about as long as wide, trapezoidal, narrowed in front, the sides nearly straight, strongly rounded behind and constricted at base, the constriction crenulate, apical furrow deep, carried round front angles and along sides to basal third, where there is a seta, but no tooth, another seta at about apical sixth, median line fine, surface smooth. *Elytra* convex,

a little wider than prothorax, oval, border widened at sides of base, and very slightly dentate behind shoulder, marginal channel carried round to opposite interval 3, apex somewhat excavated at sides, striæ punctate-striate, stria 1 only reaching base and apex, intervals smooth, without pores. The front tibiæ end in a long, curved spine, and the intermediate tibiæ are without spur.

Much smaller and lighter in colour than *P. trapezicollis* Bates, the head without the side ridges on vertex, maxillary palpi similar in form, but not quite so attenuated, last joint of labial palpi much more dilated in middle, mentum smooth (shagreened in *trapezicollis*), the tooth carinate and apparently projecting a little beyond level of lobes; prothorax similar in shape, but the marginal channel ceases at the hind setiferous pore; elytra with hardly toothed shoulders, striæ much more strongly punctate, apex distinctly excavated at sides.

Ceylon: Kotte, 1 ex. Type in British Museum.

Disphæricus myrmex sp. nov.

Length: 10—11 mm.

Black, shiny: joint 1 of antennæ (rest piceous) and legs dark red (tibiæ and femora nearly black in one specimen), palpi light brown.

Head (1·2 mm. wide), elongate, slightly dilated and strongly bordered before the prominent eyes, and deeply constricted behind them, neck tumid, two deep furrows, converging in front, but not meeting and not quite reaching clypeus, just separated behind from two short furrows, one on each side, between eye and vertex, clypeus bisetose, depressed at sides, the middle raised in the form of a rounded boss, labrum small, slightly emarginate, mandibles porrect and strongly toothed, mentum wide, with a sharp tooth in the sinus, palpi setose, last joint securiform, truncate, joint 3 of maxillaries very short, joint 2 of labials bisetose, antennæ thick, not reaching much beyond base of prothorax, setose from middle of joint 3, but apex of 2 with some long setæ, surface smooth and polished, transversely striate beneath. *Prothorax* very convex, oval, longer than wide (2·75 × 2·40 mm.), declivous and almost

vertical behind, base widely bordered, truncate, apex slightly emarginate, front angles adjoining neck, sides evenly rounded, with a very fine border, a pore and seta at middle, hind angles indistinct, flattened against sides of base; median line very clear and deep, especially behind, where it joins the marginal groove, no transverse impressions or foveæ, surface smooth and polished. *Elytra* convex, oval (3·5 × 6·0 mm.), pedunculate, shoulders obliterated, sides strongly and evenly rounded, slightly sinuate before apex; suture widened and very deep close to base, no scutellary striole, 9–striate, the striæ finely punctate, 1 joins marginal channel in front, but does not quite reach apex, 2 arises and ends independently (but in one specimen it joins 1 in front), 3 arises in an umbilicate pore and joins 4 behind, 5 and 6 join behind, 7 reaches apex, 8 and 9 arise in marginal channel near base, but 9 is only clearly visible behind, the outer striæ shorter at both ends than the inner ones, intervals convex, 3 without dorsal pores, 8 with an interrupted row of umbilicate pores, surface smooth and polished. *Sterna* smooth and polished, prosternum channelled, metasternum with a deep rounded depression in middle, its episterna very small, as long as wide. *Venter* deeply sulcate and depressed at sides, surface smooth, the segments each with a single setiferous pore, apical segment ♂ with two large ones on each side, ♀ with half a dozen on each side, irregularly disposed. *Legs:* front femora clavate, front tibiæ arcuate, all the tibiæ clothed with golden pubescence towards apex, ♂ four dilated joints to front and middle tarsi, clothed with scales beneath, and densely fringed with long golden hairs at sides, all tarsi hairy above, the hinder pair rather scantily, claws simple.

Considerably larger than *D. ovicollis* Bates, the legs, antennæ, and palpi darker. Head with stouter antennæ, larger eyes, and the last joint of the palpi more strongly dilated; prothorax similar, but the outline of the margin more oblique behind the front angles; elytra with stria 6 well-defined (rudimentary in *ovicollis*), 7 originating nearer the base. Bates' description of the prothorax of his *ovicollis* is very misleading. He says: "The thorax attains its greatest width immediately behind its anterior angles," whereas in fact it is regularly oval, and like the new species, widest at about middle.

Ceylon : Koggala and Velverry, 2 ex. ♂♂. Madras : Anaimalai Hills, Anaipady, 1 ex. ♀. (Agric. Coll. and Res. Inst. Coimbatore). Type in British Museum.

Craspedophorus halyi sp. nov.

Length : 12·0—13·0 mm. Width : 4·9—5·4 mm.

Black, each elytron with two orange-coloured fasciæ : palpi, apical joints of antennæ, and tarsi piceous.

Head small and narrow (2·0 mm. wide), with prominent hemispherical eyes, neck smooth and polished, strongly constricted behind eye, clypeus and labrum smooth, frontal foveæ elongate and fairly deep, surface rugosely punctate, antennæ filiform, slender, nearly reaching middle of elytra, labrum narrow, emarginate, the two middle setæ a little removed from front margin, mandibles hooked at tip, palpi long and slender, mentum very wide, with rounded lobes, a very shallow and open sinus, tooth very short. *Prothorax* moderately convex, transverse (3·0 × 4·0 mm.), much more contracted in front than behind, widest at basal third, extremities truncate, front angles adjoining neck, sides explanate behind, with a fine, hardly appreciable border, strongly dilated, but very little rounded, from apex to basal third, then sharply rounded, and slightly sinuate (both horizontally and vertically) to base, the hind angles in the form of a minute rectangular tooth ; median line clearly marked, foveæ fairly deep, extending to base, the sides of which are very distinctly raised, the whole surface coarsely and a little confluently punctate, the epipleuræ smooth. *Elytra* (5·4 × 8·25 mm.) convex, oval, widest a little behind middle, sides gently rounded, distinctly sinuate near apex ; striæ deep, closely and clearly punctate, intervals convex, finely but not closely punctate, pubescent, the epipleuræ finely asperate ; the front fascia is fairly wide, and extends from the border a little below the shoulder to stria 2, the coloured patch on interval 3 very short the hind fascia rather smaller, a little transverse, from stria 8 to 3. *Sternum :* all the sterna coarsely punctate, metepisterna distinctly longer than wide. *Venter* coarsely

punctate at sides, finely punctate and a little pubescent in middle, the segments distinctly crenulate along front margin. *Legs :* tarsi pilose on both upper and under surfaces.

A little smaller than *C. bifasciatus* Cast. Head with the joints of both antennæ and palpi longer and more slender ; prothorax less convex, sides more explanate and reflexed behind, hind angles with a distinct rectangular tooth ; elytra, with both intervals and striæ more finely punctate, the front and hind fasciæ orange, reaching striæ 2 and 3 respectively (in *bifasciatus* yellow, and reaching striæ 1 and 2). Tarsi hairy beneath.

Ceylon : Niroddumunai, 2 ex. Type in my collection ; cotype in Colombo Museum.

Oodes taprobanæ sp. nov.

Length : 9·0—10·0 mm. Width : 3·75—4·2 mm.

Black, iridescent and shiny beneath, above rather dull, the whole surface minutely punctate (as in the genus *Anatrichis*), antennæ, palpi (apex lighter), tibiæ, and tarsi piceous.

Head (1·6 mm. wide) convex, eyes large and moderately prominent, clypeus slightly emarginate, frontal foveæ punctiform, antennæ and palpi slender, latter truncate at apex. *Prothorax* transverse (2·4 × 3·5 mm.), convex, both base and apex widely and slightly emarginate, strongly contracted in front, gradually dilated and evenly rounded to base, which is very slightly wider than base of elytra, a minute (presumably setiferous) pore just inside hind angle on basal margin, angles right, hardly rounded ; median line excessively fine, basal foveæ obsolescent, but visible. *Elytra* (3·75 × 5·2 mm.) moderately convex, elongate-ovate with truncated base, border rather fine, sinuate near apex, shoulders square, minutely toothed ; striæ fine and very finely punctate, not obliterated at sides, 1 and 2 arising from a common umbilicate pore, intervals nearly flat, but a little convex at sides, 8 as wide in middle as the other intervals, convex close to shoulder, narrowed and very convex towards apex, 3 with a pore behind middle and another towards apex.

Prosternal process finely bordered and a little rounded at apex, in front of it a deep oval puncture, metepisterna only a little longer than wide, not sulcate, feebly punctate, sides of ventral surface finely but indistinctly punctate, margin of last segment faintly sinuate, with a single pore and seta on each side ♂, two in ♀, front tarsi ♂ rather widely dilated.

Not unlike *O. peguensis* Bates, but narrower and more regular in outline. Head with more evident and punctiform foveæ, labrum not depressed, clypeus not bordered, palpi more slender; prothorax rather less narrowed in front, basal foveæ obsolete; elytra with interval 8 as wide, for most of its length, as the others, 3 with second puncture nearer apex. The metepisterna are much less coarsely punctate.

Ceylon: Vavuniya, 1 ex. ♂. Anuradhapura (Dr. W. Horn—Deutsch. Ent. Mus.), 1 ex. ♀. Type in the British Museum.

Chaudoir's statement that in the genus *Oodes* there is no setiferous pore at the hind angles of the prothorax is not always true. There is such a pore, though a small one, both in this species and in *O. parallelus* Laf.

Oodes xanthochilus sp. nov.

Length: 8·0 mm.

Black, shiny, strongly iridescent: head, with antennæ and buccal organs, prothorax, a stripe on each elytron on intervals 6-8, curving inwards behind and meeting at apex, and legs testaceous red. The head, above and beneath, middle of prothorax beneath, epipleuræ of elytra, and interval 9 (with marginal channel) to near apex, are darker, almost piceous, the legs a little lighter.

Head (1·5 mm. wide) convex, smooth, eyes large and moderately prominent, clypeus slightly emarginate, frontal foveæ small but distinct, antennæ fully reaching base of prothorax, maxillary palpi rounded at apex, labial palpi wanting. *Prothorax* rather flat, transverse (2·0 × 3·0 mm.), both base and apex widely and slightly emarginate, contracted in front, where apex is hardly wider than head, evenly rounded and dilated to base, which is hardly narrower than elytra, the narrow side border extends some little way on each side

along apical margin, but behind it only just turns the hind angle and ends in a small pore, both front and hind angles slightly rounded, latter about right; median line very fine, basal foveæ small but distinct, surface smooth. *Elytra* (3·2 × 4·5 mm.) moderately flat, ovate with truncated base, a little pointed behind, border sinuate near apex, shoulders square; striæ deep, very finely crenulate, not obliterated at sides, 1 and 2 arising from a common umbilicate pore, intervals fairly convex, 8 wider and 7 narrower at base than the other intervals, 3 with an almost invisible pore near apex, surface smooth.

Prosternal process bordered and bluntly pointed at apex, metepisterna a little longer than wide, not sulcate, slightly punctate, ventral surface rather vaguely punctate at sides, last segment emarginate and with a single pore and seta on each side, front tarsi ♂ widely dilated.

Widely different in form from any other Eastern *Oodes*, with exceptionally deep striæ (deeper than in *O. rhodopus* Bates), and distinguished at once by its unusual coloration.

Ceylon: Kala-oya river, 1 ex. ♂. In the British Museum.*

PLATYMETOPUS PICTUS sp. nov.

Length: 7·0—8·0 mm. Width: 2·4—2·8 mm.

Piceous beneath, lighter along median line; upper surface dark aeneous, palpi, joints 1–3 of antennæ (rest fuscous), labrum, margins and epipleuræ of prothorax, legs, and a pattern on elytra testaceous. The elytral pattern consists in a broad testaceous stripe on each side, covering intervals 6–8, and extending from base to apex, but more or less interrupted behind middle on 7–8, with an apical patch joining it; the aeneous colour on interval 3 extends nearly to apex, on 4–5 to about a fourth, and on 1–2 to about a sixth from apex; interval 4 is sometimes, and 1–2 more rarely in part testaceous. The body is covered with a short, erect pubescence, leaving the surface moderately shiny.

* A second specimen (♀) has recently been taken Mr. E. A. D' Abreu at Balaghat in the Central Provinces. This is larger and distinctly wider (3·6 mm.) than the ♂; it is also less iridescent. The elytral striæ are not so deep, the intervals wider and flatter; the apical ventral segment has two pores on each side.

Head short, wide, convex, eyes moderately prominent, genæ oblique, surface finely but not closely punctate, antennæ reaching but little beyond base of prothorax. *Prothorax* cordate, convex, transverse, a third as wide again as head, and half as wide again as long, base truncate, apex a little emarginate, sides rounded in front and very slightly sinuate before the rectangular hind angles, the short median line, basal transverse depression and foveæ, all lightly impressed, surface finely punctate, more coarsely along base. *Elytra* moderately convex, nearly parallel, a little wider than prothorax, less than twice as long as wide, shoulders rather square. margin faintly sinuate before apex; punctate-striate, the punctures fine and close together, the surface finely punctate.

A little smaller and much less closely and finely punctate than *P. flavilabris* F. The pattern of the elytra, which almost exactly reproduces that of *P. figuratus* Boh., at once distinguishes the species from all its Eastern congeners.

Ceylon, S. India, N. W. India, also Yemen in Arabia (Millingen—Brit. Mus.). Central India (Gen. Hearsey—Oxford Mus.). United Provinces: Sitapur (H. G. Champion). Bombay: Belgaum dist., Gunji (H. E. Andrewes). Madras: Bellary dist., Yemmiganur and Coimbatore (T. B. Fletcher—Agric. Res. Insts. at Pusa and Coimbatore). Mysore: Bangalore (N. Annandale—Ind. Mus.) and "Mysore" (Dr. T. V. Campbell—E. A. Butler coll.). The type (Mysore) is in my collection.

I have preserved for the species Chaudoir's MS. name.

Hypolithus lividus sp. nov.

Length: 7·5—9·0 mm. Width: 2·8—3·1 mm.

Under surface black, upper surface very dark iridescent blue, shiny; buccal organs, joints 1–3 of antennæ (rest piceous), and legs testaceous, tibiæ and tarsi a little darker.

Head convex, with large prominent eyes, clypeal suture very faint, lightly depressed at extremities, between which and eyes there is at most only a slight indication of an impressed line, surface finely and faintly punctate. *Prothorax* quadrate, slightly convex, transverse, more contracted in front than behind, half as wide again as head and about a third as wide

again as long, base truncate, apex a little emarginate, sides uniformly rounded, a little explanate towards base, not sinuate behind, hind angles obtuse, moderately rounded, and finely bordered ; the usual impressions all lightly marked, surface closely punctate, finely on disk, rather more coarsely and also confluently along base, especially near hind angles. *Elytra* elongate, moderately convex, a little wider than prothorax, and about two-thirds as long again as wide, border sharply angled at shoulder, sides parallel, lightly sinuate near apex ; striæ clearly incised, almost imperceptibly crenulate, intervals nearly flat, but convex near apex, odd ones seriately punctate, the punctures small and numerous, surface very finely and closely punctate. Underside finely but not closely punctate.

Allied to *H. acutangulus* Bates, but more elongate, parallel, and shiny. Head wider, more finely and sparsely punctate, with only a vestige of an impressed line between clypeal suture and eye ; prothorax with rounded hind angles, the surface less coarsely punctate along base ; elytra longer, more parallel, and much more shiny, the punctures on the surface similar in size, but much more distinct.

Ceylon : Colombo. Central Provinces : Nagpur (E. A. D'Abreu). Bombay : Belgaum (H. E. Andrewes), Surat (H. M. Lefroy), Bombay Town (N. B. Kinnear). Bengal : Calcutta (J. Wood Mason), Chapra (Mackenzie), Muzaffarpur, Sarda (F. W. Champion), Siripur. Bihar : Pusa (T. B. Fletcher), Kierpur and Katihar (C. A. Paiva). United Provinces : Sitapur (H. G. Champion), Lucknow (E. A. D'Abreu), Hurdwar and Roorkee (J. Wood Mason). Punjab : Rawalpindi (R. Hodgart). The type (Nagpur) is in my collection.

ANOMOSTOMUS Laferté Rev. et Mag. Zool. 1853. 376.

Head large, very wide, convex, extending forwards very little beyond eyes, neck inflated, gula with a large setiferous pore on each side, close to buccal fissure ; eyes large, but not prominent, not far removed from buccal fissure, a single supra-orbital seta ; clypeus short, deeply emarginated in a regular arc in front and bordered, exposing the basal membrane of the labrum, bisetose at front angles, the suture with

a fine pore behind each extremity, which is carried forward, not backward towards eye ; labrum small, narrow, sex-setose, emarginate, with rounded angles ; mandibles short but powerful, without seta in the scrobe, slightly curved at apex, blunt, edentate, widely separated at base, and when closed completely concealed by the labrum ; ligula short and narrow, bisetose, surrounded by the wide membranous paraglossæ, which are glabrous, dilated at apex, with a notch at the point where they meet in front ; mentum small but wide, emarginate and without tooth ; maxillæ short, hooked at apex and very sharp, fringed with few but stout spinules ; palpi small, sparsely setose, last joint acuminate, but truncated at tip, equal in labials to penultimate, a little longer in maxillaries ; antennæ pubescent from joint 3, the joints about equal, but two a little shorter than the rest. *Prothorax* very wide, bordered throughout, though very finely in front, a seta at sides just before middle, none at hind angles, which are almost completely rounded. *Elytra* short and quadrate, convex, with bordered base, 9-striate, 8 rather deeply impressed in front and behind, a scutellary striole, intervals flat, 3 with a single pore near apex, adjoining stria 2, apex truncate and slightly emarginate on each side, without any inner plica. *Sternum :* prosternal process rounded, finely setose, metepisterna elongate, strongly narrowed behind. *Venter* with the segments finely bordered, bisetose, last one with two widely distant setæ on each side. *Legs* rather short, front tibiæ moderately notched, half a dozen small spines on outer margin, apex not produced externally, middle and hind tibiæ spinulose, tarsal joints triangular, hind tarsi with joint 1 very nearly equal to 2 + 3 + 4. In none of the specimens examined are the front tarsi dilated or squamulate beneath. One example is certainly ♀, and I think possibly all belong to this sex.

Laferté's description of the genus being very incomplete, I have re-described it, and have given to the species the name which Chaudoir had intended to give it, had he lived to complete the work on the Harpalini upon which he was engaged at the time of his death. The genus seems to be most nearly allied to *Amblystomus*, though differing in its symmetrical

head and setose palpi. The only species known at present come from West Africa, and are unknown to me; according to Laferté the typical species, *A. torridus*, Laf., has no prothoracic marginal channel, and this appears to be the chief structural difference between it and the Indian species.

ANOMOSTOMUS ORIENTALIS sp. nov.

Length: 6·0—8·0 mm. Width: 2·6—3·0 mm.

Black, shiny, elytra often with a greenish tinge, labrum, joints 1–2 of antennæ, palpi, and legs testaceous red, joints 3–11 of antennæ, border of prothorax and elytra, and underside more or less piceous red.

Head very smooth, not contracted behind, antennæ just reaching base of prothorax. *Prothorax* a little wider than head and twice as wide as long, base arcuate, apex widely though slightly emarginate, sides evenly rounded, though contracted a little more behind than in front; median line and transverse impressions faint, basal foveæ small but distinct, punctate, marginal channels slightly crenulate, surface generally smooth. *Elytra* with very square shoulders, very little wider than prothorax, and half as long again as wide, striæ clearly cut and finely crenulate, marginal series of pores widely interrupted, surface very finely but not closely punctate, much more evidently along marginal channel and towards apex.

Ceylon: Hambantota (Colombo Museum), "Ceylon" (British Museum). Madras: Madura (R. Barton Wright—my collection (type)) and Madras town (Capt. Patton—Bomb. Nat. Hist. Socy., and Tomlin—coll. Champion). Mysore: Chikkaballapura (T. V. Campbell—coll. E. A. Butler). Orissa: Puri (F. H. Gravely—Ind. Mus.).

ACUPALPUS HORNI sp. nov.

Length: 3·5—4·0 mm. Width: 1·1—1·3 mm.

Testaceous yellow or red, shiny, disk of elytra (except suture) and head often darker, sometimes black.

Head very convex, eyes prominent, clypeal suture very deep, produced backwards to eye on each side, so that there is a distinct ridge along each side of head in front, antennæ

rather thick, reaching a little beyond base of prothorax, surface quite smooth. *Prothorax* quadrate-cordate, rather flat, a little wider than head, and about a third as wide again as long, extremities truncate, middle of base produced slightly backwards, sides reflexed, more widely behind, slightly rounded in front, with a long faint sinuation to the nearly rectangular hind angles; median line entire, deep and comparatively wide, basal foveæ short, deep, wide, and linear, the side border turning the angles and just reaching their base, the whole basal area rather depressed, surface smooth. *Elytra* elongate, parallel, depressed, about half as wide again as prothorax, and nearly twice as long as wide, apex almost truncate, striæ fairly deep, very finely crenulate, intervals moderately convex, 3 with a single pore rather behind middle. Ventral surface distinctly pilose; front tarsi ♂ with joints very little dilated, scaly beneath.

Not unlike *Acupalpus sinuellus* Bates and belonging to Motschulsky's *Anthracus* group. Form more slender and coloration rather different, the antennæ in particular being uniformly testaceous. Head with less prominent eyes and deeper clypeal suture; prothorax more quadrate, base impunctate, the foveæ linear and very clearly cut; elytra narrower, the intervals narrower and rather more convex.

Ceylon: Anuradhapura (Dr. W. Horn—Deutsch. Ent. Mus.). Burma: Mandalay (H. L. Andrewes—my collection (type)); Tenasserim (J. W. Helfer—Prague Mus.); India: Bombay, Belgaum (H. E. Andrewes "taken under stones along margin of large tank, Dec. 1886"); United Provinces: Sitapur (H. G. Champion).

The Belgaum examples are uniformly light in colour, the Ceylon examples both light and dark, the Mandalay and Sitapur examples dark.

Abacetus henryi sp. nov.

Length: 5·25—7·0 mm. Width: 2·0—2·5 mm.

Black, iridescent, shiny: joints 1–3 of antennæ, palpi, apical border of elytra, and legs red, rest of antennæ brown.

Head rather small, convex, eyes moderately prominent, frontal furrows short, not usually deep, curved sharply outwards behind, and generally continued as a fine line round eyes, thus producing a slight ridge just inside front supra-orbital pore, clypeus and front both transversely depressed, front of head on each side generally with a faint oblique depression ; surface quite smooth. *Prothorax* convex, much wider than head, slightly transverse, widest just before middle, about equally contracted at extremities, base truncate, its sides a little oblique, apex slightly emarginate, both bordered at sides, but along the base there is also a faint, generally crenulate line, connecting (or nearly so) the basal furrows, sides with a moderately narrow reflexed border, very evenly rounded and not sinuate before hind angles, which are obtuse but not rounded, a pore and seta a little before middle and another on the angle ; median line very faint, but more visible towards base, basal furrows fairly short and straight, linear, joining the marginal channel along sides of base, surface quite smooth throughout. *Elytra* moderately convex, nearly half as wide again as prothorax, and not quite twice as long as wide, basal border bisinuate, forming with side border an obtuse angle at shoulder, sides nearly parallel, slightly sinuate near apex, which is a little pointed ; striæ fairly deep and clearly cut, impunctate, though 8 and marginal channel are sometimes faintly crenulate, 2 with an umbilicate pore at base, intervals not very convex, 3 with a pore adjoining stria 2 and placed a little behind middle, marginal series on stria 8, which is deeper than the other striæ, surface smooth.

Allied to *A. dejeani* Nietn., but larger. Head similar, prothorax a little wider, not so narrowly bordered, basal furrows parallel with median line, not inclining behind towards the hind angles, the space between them quite smooth (though this is sometimes the case in *dejeani*) ; elytra with more rounded sides, the striæ not quite so deep.

Ceylon : Kala-oya river (type) and Colombo ; Negombo, Matale, Kandy, and Anuradhapura (Dr. W. Horn—Deutsch. Ent. Mus.). Madras : Trichinopoly, 1 ex. Type in British Museum.

COLPODES FLETCHERI sp. nov.

Length : 11·0 mm. Width : 4·6 mm.

Black : palpi, antennæ, and legs testaceous red, margin of prothorax rufous.

Head very convex, with prominent eyes, frontal foveæ elongate, shallow, labrum depressed in middle, mandibles and palpi elongate, antennæ slender, filiform, reaching basal third of elytra. *Prothorax* moderately convex, cordate, transverse, half as wide again as head, and about a third as wide again as long, base truncate, its sides a little oblique, apex emarginate, front angles rounded, sides rather widely explanate and reflexed, widest before middle, strongly rounded in front, sinuate just before hind angles, which are slightly obtuse, but very little rounded ; median line fine, transverse impressions moderate, basal foveæ fairly deep, continued forwards nearly to apex as a fine groove, parallel with margin, surface smooth, with some fine cross striation, base and margins faintly rugose. *Elytra* rather flat, two-thirds as wide again as prothorax, and not quite half as long again as wide, shoulders well marked, gently dilated behind and widest at two-fifths from apex, margin rather strongly sinuate behind, with a re-entrant angle at apex, and a small blunt tooth at the end of interval 1 on each side ; striæ, including a scutellary striole, very clearly incised and finely crenulate, 5 exceptionally deep on basal half, intervals nearly flat, 3 with three pores, at one, three, and four fifths from base, surface smooth but uneven, an elongate depression on basal half covering intervals 4–6, and a much smaller and slighter one towards apex on 5–6. Metepisterna considerably longer than wide. Tibiæ with a fine external groove ; tarsi grooved on each side, joint 4 moderately bilobed, on metatarsi the outer lobe a little longer than the inner one, joint 5 glabrous.

About the size of the common Eastern species *C. buchanani* Hope, but black. Head more convex, mandibles and palpi longer ; prothorax wider, sides more broadly explanate, more reflexed ; elytra wider, more deeply striate, with a strongly marked elongate depression, middle and hind pores on interval 3 much further towards apex.

Ceylon : Madulsima (T. B. Fletcher), 2 ex. ♂♀. The type is in the British Museum : cotype in my collection.

Euplynes marginatus sp. nov.

Length : 6·25—7·0 mm. Width : 2·75—3·0 mm.

Testaceous red, shiny : elytra with a black margin, occupying about two-fifths of each elytron, reaching stria 6 at shoulder and gradually widening behind, just reaching suture near apex, but leaving the actual apex and the whole border narrowly red.

Head flat, eyes prominent, frontal foveæ short, but clearly marked, curving towards eye, surface smooth, very minutely—almost imperceptibly—punctate. *Prothorax* transverse, rather flat, a third as wide again as head, base and apex truncate, former with oblique sides, front angles quite rounded, sides rounded, sinuate just before hind angles, which are sharp and would be rectangular, but for the oblique sides of base, a pore and seta at apical third, and another on hind angle (though the setæ here are abraded) ; median line well marked, basal foveæ obsolescent, surface (like that of head) minutely punctate, faintly rugose in the foveæ. *Elytra* rather flat, nearly twice as wide as prothorax, and half as long again as wide, sides gently rounded, hardly truncate at extremity ; striæ fine, minutely but not very noticeably crenulate, intervals 1–6 flat, 7–8 narrower and more convex, especially on shoulder, 3 with three pores, at a quarter and a half (adjoining stria 3), and at five-sixths (adjoining stria 2), 5 with a deep longitudinal depression on basal half (though not reaching base or middle), curving inwards behind and occupying at least half of each of the two adjoining intervals, marginal series slightly interrupted at middle, the pores large, surface shagreened and minutely punctate.

Very much like *E. limbipennis* Bates, but the elytral margin is black instead of blue-green. Head and prothorax similar, but basal foveæ of latter much less marked ; striæ of elytra finer and less evidently crenulate, intervals flatter, the pores on 3 smaller, the depression on 5 curving inwards behind, not straight.

Ceylon : 2 ex. The type is in my collection and is labelled Kekirawa ; the second specimen (cotype), which has no locality label, is in the Colombo Museum. In the other described species from Ceylon, *E. dohrni* Nietn., the elytra are said to be green.

ARAME STIGMA sp. nov.

Length : 6·75 mm. Width 2·0 mm.

Black : palpi and joints 1–3 of antennæ testaceous, rest of antennæ brown ; last ventral segment and legs rufous, base of femora lighter ; a white apical spot on each elytron.

Head convex, fairly wide, obliquely and gradually narrowed behind the prominent eyes to the very narrow, condyliform neck, front strongly bi-impressed, a small, shallow depression in middle, surface smooth and polished, two erect setæ on each side behind (in addition to the supra-orbital setæ), neck finely, transversely striate. *Prothorax* elongate, convex, cylindrical, dilated in middle, narrower than head, and nearly twice as long as wide, strongly contracted at extremities, but narrower in front than behind, widest a little behind middle, base constricted and transversely striate, sides without border, but each with a row of about five long erect setæ, a slight longitudinal groove on each side close to neck, median line very fine, surface smooth. *Elytra* moderately convex, twice as wide as head and half as long again as wide, shoulders oblique, but rather sharply angled, slightly dilated behind and widest at apical third, apex truncate, rather faintly striate punctate, the punctures much more visible close to base, 8 and 9 much deeper than the others, scutellary striole very faintly marked ; intervals flat, 3 and 5 each with 6–8 erect setæ ; surface smooth, but very finely shagreened, a strong transverse impression at a fourth from base, the white spot at a fifth from apex, on intervals 5–6, nearly round, but produced a little both in front and behind. The under, like the upper surface is impunctate, the metepisterna very long and narrow, the femora sparsely clothed with long hairs.

Very closely allied to *A. distigma* Chaud.—(*A. bimaculata* Schm.-Goeb.) from Burma, but rather differently coloured, the prothorax black (not brown red), the elytral spot smaller

and white (not yellow). Head similar, but with larger eyes ; prothorax wider, less attenuated in front ; elytra shorter, less distinctly striate, interval 5 with numerous setæ (instead of only one), interval 7 without setæ.

Ceylon (Thwaites), 2 ex. Type in Oxford University Museum (Hope Dept.) ; cotype in my collection.

Zuphium erebeum sp. nov.

Length (including abdomen): 9·0 mm. Width : 3·0 mm.

Piceous : apex of palpi testaceous, labrum, femora, an ill-defined shoulder spot, and apical border of elytra dark reddish-brown.

Head convex behind, flat in front, shiny, eyes flat, genæ sharply rounded and reaching neck at a right angle, a triangular punctured depression on middle of front, surface finely and a little sparsely punctate. *Prothorax* cordate, moderately convex, hardly longer than wide, a third as wide again as head, base truncate in middle, strongly bisinuate at sides, apex slightly arcuate, sides finely bordered, gently rounded in front, strongly contracted behind, sinuate at some little distance before base, hind angles right, projecting a little laterally and moderately reflexed ; median line extremely fine, rather deeper near base, the foveæ deep, somewhat elongate, contiguous to hind angles, surface finely, closely, and uniformly punctate. *Elytra* rather flat, nearly parallel, truncate at apex, shoulders moderately rounded, not quite twice as wide as prothorax, a third as long again as wide ; striæ faintly punctate, only vaguely indicated behind, rather more clearly in front, where the intervals are slightly convex, marginal series of pores widely interrupted in middle, surface extremely finely and closely punctate ; the very vaguely marked shoulder spot extends inwards from near margin to stria 3.

About the size of the common and widely distributed *Z. olens* Rossi, but quite differently coloured. The head and prothorax differ little in form, though the latter is rather wider, and its base a good deal more strongly sinuate at sides ; elytra much shorter, the striæ obsolete behind, the surface a little more finely punctate.

Ceylon, 1 ex. British Museum.

GNOPHODES gen. nov.

Head small, convex, narrowed behind, eyes not very prominent, reaching buccal fissure, two supra-orbital setæ, the hind one distant from eye; a gular seta on each side, considerably behind buccal fissure; clypeus bisetose, truncate, suture faint, ending on each side in a small pore; labrum small, quadrate, sex-setose, very slightly emarginate; mandibles slender, curved and sharp at apex; ligula elongate, dilated and arcuate at apex, quadri-setose, paraglossæ coriaceous, adnate, narrower than ligula, though not much longer, completely enveloping it, densely setose at apex; mentum edentate, a long seta on each side of the sinus at base, lobes nearly straight within, strongly rounded outwardly; maxillæ elongate, curved at apex, and sharply pointed, densely fringed with very fine hairs; palpi slender, last joint compressed, rounded at apex, in maxillaries 4 is half as long again as 3, in labials 2 = 3, 2 unisetose on inner margin; antennæ densely pubescent from joint 5, but 2–4 are sparsely pubescent, joint 1 = 5, 2 very short, 3 about twice as long as 2, 4 rather shorter than 3, the remainder a little shorter than 4. *Prothorax* convex, apex emarginate, sides widely explanate and reflexed, two well-marked setiferous pores on the margin, one at middle, the second at hind angle. *Elytra* moderately convex, quadrate, but with sides strongly rounded behind shoulders, apex truncate, 9-striate, but stria 9 more or less obsolete, interval 9 and marginal channel forming a moderately wide, explanate, and reflexed margin, a short scutellary striole between stria 1 and suture, interval 3 with two pores, one rather behind middle, the second at apical fourth. *Sternum:* prosternal process unbordered, with one or two small setæ, metepisterna narrowed behind, not much longer than wide. *Venter* with segments bisetose, last segment bisetose in ♂, quadrisetose in ♀. *Legs* slender, tibiæ minutely setose, tarsi glabrous above, in hind pair joint 1 = 2 + 3, front tarsi ♂ with three moderately dilated joints, clothed with scales beneath, claws long, each with some half dozen short teeth on basal two-thirds.

The new genus belongs to the *Coptoderini*, and in some respects is not unlike *Thyreopterus* and *Peripristus*, but joints 2–4 of the antennæ are sparsely pilose, the claws pectinate,

the paraglossæ pilose, and the shape of the prothorax quite different. There is no sign of denticulation on the elytral border, as in *Peripristus* and *Sinurus*.

GNOPHODES PEARSONI sp. nov.

Length : 9·5—10·5 mm. Width : 3·5—4·25 mm.

Black, shiny, the elytra sericeous : buccal organs, antennæ, legs, margins and epipleuræ of prothorax and elytra a rather dull red.

Head (1·5 mm. wide) with narrow neck, and very oblique genæ, frontal furrows obsolete, but the front is uneven at sides, antennæ barely reaching basal fourth of elytra. *Prothorax* as long as wide (2·6 mm.), sides of base cut away very obliquely and strongly reflexed, contracted rather more in front than behind, sides evenly rounded, not sinuate before base, front angles porrect, hind angles obtuse and inconspicuous ; median line well marked, reaching extremities, front transverse impression visible at middle, hind one fairly deep, foveæ small but continued forwards as a faint depression, parallel with margin, surface impunctate with a few fine transverse striæ. *Elytra* (4·25 × 5·5 mm.) with well-marked basal border, bisinuate, narrower than prothorax at middle, and rounded at shoulder, sides rounded, greatest width rather before middle, apical truncature only slightly oblique, moderately emarginate on each side, outer angles rounded, a small re-entrant angle at apex, the base much narrower than the truncate apex, striæ finely crenulate, intervals nearly flat, marginal series of pores interrupted, surface smooth, very finely shagreened.

I do not know of any species with which I can profitably compare this. The prothorax is rather like that of a *Dolichoctis*, with much rounded hind angles ; the elytra, compared with those of *Peripristus ater*, are more convex, much narrower at base and more sharply dilated behind shoulder, the apical truncature wider, stria 9 obsolete, border not serrate.

Ceylon : Hakgala, 1 ex. ♂ (Colombo Mus.), Horton Plains (Dr. W. Horn—Deutsch. Ent. Mus.), 2 ex. ♂♂, 1 ex. ♀. " Ceylon " (Thwaites—Oxford Museum), 1 ex. ♀. The type is in my collection.

In one of the examples from Horton Plains, which is light brown in colour and evidently much undeveloped, there is a yellowish spot on each elytron near apex on interval 2–5 ; in a second example it is visible, though much fainter.

DOLICHOCTIS CHITRA sp. nov.

Length : 5·0—6·0 mm. Width : 2·0—2·5 mm.

Testaceous : head brown, elytra piceous black, but with two spots on each and marginal channel testaceous.

Head moderately convex, dull, shagreened without impressions, eyes rather large and prominent, antennæ reaching beyond base of prothorax. *Prothorax* moderately convex, transverse, half as wide again as head, base arcuate, apex emarginate, a little more contracted in front than behind, sides rounded in front, straight behind, moderately explanate and reflexed, a pore and seta rather before middle, forming almost an angle at widest point, another on the obtuse hind angles ; median line, basal foveæ, and transverse impression between the foveæ all fairly well marked, surface moderately shiny, faintly shagreened, and with some fine, hardly perceptible cross-striation. *Elytra* convex, short oval, rather more than half as wide again as prothorax, a third as long again as wide, shoulders well marked, sides rounded, apex truncate, slightly emarginate on each side, minutely and sharply dentate opposite sutural interval ; striæ clearly marked, faintly crenulate, intervals flat on disk, a little more convex at sides and behind, 3 with three pores, one near base, the other two at about three-fifths and four-fifths from base respectively, surface smooth and shiny ; the front spot is rather elongate, covering the shoulder and reaching margin in front, extending inwards to stria 4, hind spot rounded, covering intervals 2–5.

A little larger than *D. fasciola* Bates, and much lighter in colour, the prothorax testaceous. In Bates' species the front spot is transverse, reaching inwardly to stria 3, and not extending to shoulder, the hind spot much larger. In the new species the width of the prothorax is a little variable, but it is less than in *fasciola*, the striæ are deeper, and the outer intervals certainly more convex, the sutural interval more sharply dentate at apex.

Ceylon (H. P. Green—my collection (type) Nalanda, Negombo, and Kandy (Dr. W. Horn—Deutsch. Ent. Mus.). Ceylon (Nietner, Stettin Mus.).

Cymindoidea munda sp. nov.

Length : 6·0—7·0 mm. Width : 2·0—2·3 mm.

Piceous black, rather dull : joint 1 of antennæ, a shoulder spot on elytra, epipleuræ of elytra, and legs testaceous yellow ; rest of antennæ, palpi, front of clypeus, labrum, margin of prothorax, and marginal channel of elytra reddish, mandibles darker.

Head wide, flat, with close longitudinal striation extending forwards to middle of clypeus, eyes large, flat, clypeus slightly, labrum distinctly emarginate, antennæ rather thick, just reaching base of prothorax. *Prothorax* cordate, moderately convex, a little wider than head, very little wider than long, base strongly arcuate, the middle of the arc produced a little way backwards over the peduncle, apex moderately emarginate, front angles rounded, hind angles indicated by a minute tooth, sides bordered, gently rounded, and slightly reflexed, a pore and seta just behind front angles, another on hind angles ; median line very sharply incised, transverse impressions and basal foveæ only faintly indicated, surface finely, closely, and confluently punctate, longitudinally striate along middle of apical margin. *Elytra* elongate-ovate, flat, about half as wide again as prothorax, and more than half as long again as wide, base narrowly bordered, emarginate, shoulders porrect, gradually widened behind, widest at a third from apex, which is obliquely truncate ; finely punctate-striate, with a fairly long scutellary striole, intervals slightly convex, 3 with two pores, near stria 3, one rather before and one behind middle, surface shagreened, rather dull ; the shoulder spot extends inwards to stria 4 (type), and to stria 5 (Ceylon ex.) with a slight indentation behind on interval 8.

Closely allied to *C. nigra* Chaud., but with testaceous legs and shoulder spot. Head and prothorax very similar, but the base of the latter is more produced and less coarsely punctate, the intervals of the elytra impunctate, and the two pores on 3

much less conspicuous. The South African *C. humeralis* Pér., is almost exactly similar in pattern, but differs in some structural characters.

India : Nilgiri Hills (H. L. Andrewes—my collection (type)), 1 ex. ; Ceylon : Bandarawela (Dr. W. Horn—Deutsch. Ent. Mus.), 2 ex. ; cotypes.

Microlestes demessus sp. nov.

Length : 3·5 mm. Width 1·2 mm.

Black, with faint aeneous tinge beneath, above aeneous, finely shagreened, glossy ; legs more or less piceous, tips of palpi, coxæ, and trochanters testaceous.

Head rather flat, smooth, but with very fine scattered punctures, impressions obsolete, sides of front finely bordered, eyes large and prominent. *Prothorax* transverse, moderately convex, hardly wider than head, base bordered and moderately produced in middle, its sides oblique, apex emarginate, very finely bordered, sides bordered, gently rounded in front, hardly sinuate before the obtuse hind angles, a seta at apical third and another on the hind angles ; median line short but deep, hind transverse impression fairly marked, the foveæ shallow and ill-defined, surface smooth (like that of the head), but with fine scattered punctures, base a little more coarsely punctate. *Elytra* rather flat and nearly parallel, though contracted near base and with rounded shoulders, twice as wide as prothorax, and rather more than half as long again as wide, rectangularly truncate at extremity, leaving the abdomen largely exposed, outer angle widely rounded ; punctate-striate, the striæ faint, especially at sides, the punctures extremely minute, 1 and 2 arising in a large umbilicate pore, interval 3 with two pores, one adjoining stria 3 and placed rather before middle, the second adjoining stria 2 at apical fourth ; surface with minute scattered punctures, apical sixth much more shiny than the rest.

Distinctly duller than *M. inconspicuus* Schm.-Goeb., the prothorax with deeper median line, the elytra much more elongate, the sides less rounded, the striæ more evident, the glossy surface more opaque.

Ceylon : Kanthalay, Trincomalee, and Anuradhapura (Dr. W. Horn—Deutsch. Ent. Mus.). The type is in my collection ; cotypes in Deutsch. Ent. Mus.

Lebia dichroma sp. nov.

Length : 4·5—6·0 mm. Width : 1·8—2·6 mm.

Testaceous with a reddish tinge on upper surface, moderately shiny ; elytra blue, with a metallic green lustre at sides, the border and a sutural stripe reddish. The stripe at base covers three intervals on each side, from middle gradually contracting to sutural interval, generally expanding a little at apex, but sometimes disappearing altogether.

Head (1·25 mm. wide) convex behind, flat in front, eyes prominent, a small round depression at each end of clypeal suture, a shallow V-shaped depression on front, palpi short and slender, mentum with a wide tooth, not much rounded, surface moderately punctate, the punctures of different sizes, a little striate near eyes. *Prothorax* transverse (1·0 × 1·4 mm.), moderately convex, base produced in middle, the re-entrant angles obtuse, apex truncate, front angles rounded, sides very faintly bordered, distinctly explanate, more widely so behind, rounded in front, then straight to hind angles, which are nearly right and project a little laterally, a pore and seta on the angle, another within the border rather before middle ; median line faint, hind transverse impression forming a deep furrow, surface finely and confluently punctate. *Elytra* (2·6 × 3·5 mm.) moderately convex, widened behind, and widest at about two-thirds, base bisinuate, shoulders fairly marked, punctate striate, the punctures very fine, intervals slightly convex, 3 with two pores adjoining stria 3, marginal series on 9 with very large pores, uninterrupted, surface very distinctly shagreened. Claws with 4–5 teeth on each.

I know of no other Eastern *Lebia* presenting at all the coloration of this species, though in form and structure it closely resembles such species, as *L. circumdata* Schm.-Goeb., and *L. gressoria* Chaud. From these, however, it is at once distinguished by the puncturation of the head and prothorax.

Ceylon : Hambegamuwa (Colombo Museum), Anuradhapura Dr. W. Horn—Deutsch. Ent. Mus.). Madras : Nilgiri Hills (Sir G. F. Hampson—Brit. Mus.). Haidarabad : Sikandarabad (Capt. F. Butler—coll. E. A. Butler). Bombay : Khandesh (T. R. D. Bell—my collection (type)) and Bombay town (N. B. Kinnear—Bomb. Nat Hist. Soc.). Bengal : Chapra (Mackenzie—Agric. Res. Inst., Pusa).

In the example from Anuradhapura the colour is very light the elytra with a violaceous tinge ; the Sikandarabad example, on the other hand, is distinctly greenish.

Lebia monostigma sp. nov.

Length : 5·0—6·0 mm. Width : 2·2—2·6 mm.

Testaceous yellow, head, prothorax, and joints 4–11 of antennæ with a faint reddish tinge, a common, round, black spot on the elytra, just behind middle, extending on each side to stria 4.

Head rather wide, flat, with very large and prominent eyes, frontal depressions small, round, and shallow, antennæ reaching basal fourth of elytra, slightly incrassate towards apex, surface smooth. *Prothorax* moderately convex, not much wider than head, almost twice as wide as long, base truncate, with a short median lobe, sides a little oblique, apex slightly emarginate, front angles strongly rounded, sides much rounded in front, but little contracted behind, without sinuation, an explanate margin, much broader at hind angles, which are only slightly more than right, moderately reflexed ; median line slight, basal transverse impression deep, surface very finely shagreened, with some minute transverse striation. *Elytra* convex, twice as wide as prothorax, less than half as long again as wide, dilated behind and widest at apical third, sides gently rounded, apex obliquely truncate, striæ deep, faintly crenulate, though with the appearance of having closely set, large, shallow punctures, intervals convex, 3 with a single pore at apical fourth, adjoining stria 3, surface smooth and shiny. Claws pectinate, with about four long teeth on each.

Very closely allied to *L. calycophora* Schm.-Goeb., but all the black markings on the elytra in that species have disappeared, excepting the central spot; the prothorax appears rather narrower, the hind angles a little more rounded, the outer angle of the apical truncature of the elytra less rounded. It is quite possible that this may prove to be a race of Schmidt-Goebel's species.

Ceylon (Thwaites—Oxford Museum). Madras: Kodaikanal (Dr. T. V. Campbell—coll. E. A. Butler). West Sarawak: Quop (G. E. Bryant—my collection (type)).

June 8, 1922. H. E. ANDREWES.

NOTES ON SNAKES COLLECTED ON ANNASIGALLA ESTATE FROM AUGUST, 1920, TO DECEMBER, 1921.

By F. Wall, C.M.G., C.M.Z.S., F.L.S., Colonel I.M.S.

I AM indebted to Mr. W. W. A. Phillips for a very valuable collection of snakes made by him on Annasigalla Estate, Matugama, Kalutara District. In "Spolia Zeylanica" (Vol. XI., parts 43 and 44), I referred to specimens he had sent me up to August, 1920. Since that date Mr. Phillips has repeatedly sent me the results of his collecting, and the present paper deals with the material acquired between August, 1920, and December 31, 1921. The collection is an unusually valuable one, as Mr. Phillips has attached labels to his specimens, giving dates and any field notes of interest. In a few instances labels became detached in transit, and his observations unfortunately were wasted. Annasigalla is about 50 feet above sea level, and is situated in the south of the Western Province, some five miles from the sea, on the margin of the wettest zone in the Island, where the annual rainfall averages from 150 to 200 inches. The rainfall on his estate in 1921 was as follows :—

	Inches.
January	7·13
February	·49
March	2·42
April	22·63
May	15·22
June	7·19
July	8·06
August	14·32
September	5·35
October	13·37
November	8·46
December	3·71
Total ..	108·35

Family **TYPHLOPIDÆ.**

Typhlops braminus (Daudin.)

Serial No.	Date.	Length in mm.	Remarks.
	1920.		
1	November 17	138	Appeared gravid, but distension entirely due to fat.
2	November 18	132	—
	1921.		
3	January 31	152	—
4	May 28	115	Turned up from loose soil.
5	June 5	138	—
6	June 16	115	—
7	July 15	87	—
8	September 9	132	—
9	November 23	138	Found under a rotten log.

No. 6 calls for special remark. At first it appeared to me a species quite distinct from *braminus*, and it exactly accords with another specimen in the Colombo Museum labelled *braminus*, 152 mm. long, the locality of which is not on record. The colour dorsally is a uniform light brown, the belly is dirty whitish, the mouth, anal region and tail tip, white. In this respect it differs from typical *braminus*, in which the dorsal colour is a darker brown, and the scales when viewed closely are conspicuously darker in their basal two-fifths. In both specimens the suture below the nostril passes to the 2nd labial instead of to the præocular, and this is the only difference in lepidosis I can find between this and typical *braminus*. I have on two occasions, however, found typical *braminus* with this suture normal on one side, and passing to the 2nd labial on the other, and in one specimen I found the anomaly on both sides. This has led me to alter my views, and suppress the species described by me in 1919 as *fletcheri* in the Bombay Natural History Journal (Vol. XXVI., p. 556). The tail ends in a spine in both these specimens as it does in *braminus*.

Typhlops leucomelas Boulenger.

A single adult specimen 138 mm. long (5½ inches) was captured on June 18, 1921. This is only the third specimen known. It differs from Boulenger's figure (*vide* Snakes of

Ceylon, Wall, page 14) in that there is a large shield behind the interparietal. As in *braminus* the scales are darker basally than elsewhere. The species is evidently a low-country one.

Family **ILYSIIDÆ.**

Genus CYLINDROPHIS.

Cylindrophis maculatus (Linné.)

Serial No.	Date.	Length in mm.	Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.	Ventrals.	Subcaudals.	Remarks.
	1921.							
11	July 19	367	19	21	19	195	5	All subcaudals entire.
12	July 27	330	17·19	21	17	199	4	Last subcaudal divided, the rest entire.
13	Sept. 3	218	18	19	19	192	5	Under a large stone.
14	Oct. 20	299	17	19	19	196	5	Last three subcaudals entire. Penultimate ventral trifid. Among rocks and leaves.
15	Nov. 5	318	18	19	19	197	5	All subcaudals entire. Penultimate ventral trifid. Found under refuse.

Family **UROPELTIDÆ.**

It is interesting to note the complete absence of any species of this family in the locality of Annasigalla.

Family **COLUBRIDÆ.**

Genus POLYODONTOPHIS.

POLYODONTOPHIS SUBPUNCTATUS (Dumeril & Bibron.)

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.					
16	Dec. ?	♂	278	159	60	Supralabials 9 ; 3rd, 4th, and 5th touching eye.
	1921.					
17	Jan. 28	♀	389	173	57	Gravid. Contained one egg, 28 mm. long, with no trace of embryo.
18	Mar. 22	♀	340	170	35?	Gravid. Contained four eggs about 12 mm. long. Tail 43 mm., imperfect.
19	June 18	♂ ?	221	159	64	—
20	Sept. 1	♀ ?	221	168	54	The tail of a lizard (skink ?) in the stomach.
21	Dec. 15	♀ ?	342	168	53	First subcaudal entire. Found in leaves in rubber field.

Genus NERODIA.

NERODIA PISCATOR (Schneider.)

Serial No.	Date.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.				
22	Dec. 17	704	140	83	Var. *quincunciatus*.
23	Dec. 17	470	139	79	Var. *asperrimus*.
	1921.				
24	Sept. 28	548	—	—	Var. *asperrimus*.
25	Oct. 14	874	—	—	Var. *asperrimus*. In drain in rubber field.

Mr. Phillips informs me it is very common in the paddy fields.

Genus RHABDOPHIS.

Rhabdophis stolatus (Linné.)

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.					
26	Nov. 7	♀	524	—	—	Gravid. Contained five nearly mature eggs.
	1921.					
27	June 18	—	212	—	—	Found in a paddy field.
28	June 29	♀	530	143	?	Tail deficient. Four follicles impregnated.
29	July 4	♀	470	144	71	Four follicles impregnated.
30	July 7	♀	568	145	79	Gravid. Contained three eggs.
31	July 9	♂	—	—	—	—
32	July 9	♂	470	144	?	Tail deficient. Four postoculars on left side.
33	Oct. 3	—	262	—	—	—
34	Nov. 3	♂	509	141	77	Four postoculars on both sides.
35	Dec. 5	—	500	—	—	—
36	Dec. 25	♂	470	143	78	Seven supralabials, the 3rd and 4th touching the eye. Four postoculars on both sides.

In India September is the latest record for the deposition of eggs. Specimen No. 26 is therefore interesting; the eggs would probably have been deposited in November.

Genus OPHITES.

OPHITES AULICUS (Linné.)

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.					
37	Nov. 5	♀	762	202	61	Killed in cooly lines. Gravid. Contained ten eggs 19 mm. long.
38	Nov. 19	♂ ?	490	186	65	Var. *oligozonatus*. Killed in bungalow.
39	?	♀ ?	237	196	61	Var. *aulicus*. A skink in stomach.
	1921.					
40	Oct. 6	—	505	—	—	Var. *oligozonatus*. Bit a cooly, with no ill effects.
41	Nov. 5	♂	647	182	66	Var. *oligozonatus*. Killed in bathroom of bungalow.
42	Dec. 12	—	205	—	—	Var. *oligozonatus*.

The gravid specimen killed in November extends the previously known breeding season.

Genus COLUBER.

COLUBER HELENA Daudin.

Serial No.	Date.	Length in mm.	Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.	Ventrals.	Subcaudals.	Remarks.
	1921.							
43	Mar. 1	592	25	27	21	228	94	A small mouse in stomach
44	May 19	598	—	—	—	—	—	—
45	Oct. 16	1080	25	27	21	235	84	—
46	Nov. 3	1105	—	—	—	—	—	Killed in bungalow

Genus ASPIDURA.

Aspidura guentheri Ferguson.

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.					
47	Oct. 1	♀	152	110	22	—
48	Oct. 3	♂	138	108	26	—
49	Oct. 11	—	75	—	—	—
50	Do.	♂	138	108	28	—
51	Oct. 16	♀	132	109	22	—
52	Dec. 11	♀	152	112	23	Gravid. Contained one egg 16 by 3·2 mm.
	1921.					
53	Jan. 28	♂	143	106	27	—
54	Jan. 31	♀	143	112	23	Gravid. Contained one egg.
55	Feb. 8	♂	112	107	26	—
56	Do.	♂	104	108	26	—
57	Do.	♂ ?	140	111	26	—
58	Do.	♀	82	116	?	—
59	Do.	♀	82	112	23	—
60	Do.	♀	100	109	23	—
61	Feb. 9	♀	143	109	21	—
62	Do.	♂	125	109	27	—
63	Do.	♀	132	109	20	—
64	Do.	♀	158	114	23	—
65	Do.	♂	106	105	27	—
66	Do.	♀	132	111	22	Gravid. Contained one egg 12 mm. long. Last subcaudal divided.
67	Do.	♂	132	106	28	—
68	Do.	♀	140	113	21	—
69	Do.	♂	90	110	28	—
70	Do.	♂	90	109	28	—
71	Do.	♂	65	104	26	—
72	Do.	♀	138	111	20	—
73	Do.	♂	128	107	26	Remains of worm in stomach.
74	Do.	♀	100	118	21	—
75	Do.	♂	125	109	26	—
76	Do.	♂	93	109	28	—
77	Do.	♂	132	109	27	—
78	Do.	?	60	—	—	—

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.					
79	Feb. 9	♀	100	113	20	—
80	Do.	♂ ♀	100	104	27	—
81	Do.	♂ ♀	118	106	27	—
82	Feb. 5	♀	152	112	24	Gravid. Contained one egg.
83	Do.	♀	—	113	20	Gravid. Contained one egg. Last subcaudal divided.
84	Do.	♀	122	111	—	Gravid. Contained one egg.
85	Do.	♂ ♀	132	106	30	—
86	Do.	♀	138	115	21	Gravid. Contained one egg.
87	May 24	—	93	—	—	Dug out of silt.
88	May 27	—	82	—	—	Dug up from loose soil.
89	Do.	♀	148	110	25	Gravid. Contained one egg 12 by 4 mm.
90	Do.	♀	138	110	24	Gravid. Contained one egg 20 by 4 mm.
91	Do.	♀	128	112	23	Nos. 88 to 92 all found together among leaves in the bottom of a hole.
92	Do.	♂ ♀	132	110	23	—
93	Do.	♂	138	105	27	—
94	Do.	—	68	—	—	—
95	June 1	—	152	—	—	—
96	Do.	—	152	—	—	—
97	June 7	—	100	—	—	—
98	June 8	♀	164	—	—	Nos. 98 to 104 all found in dead leaves and silt when clearing out drains. Three were gravid females, each containing one egg.
99	Do.	♀	152	—	—	—
100	Do.	♀	152	—	—	—
101	Do.	♀	152	—	—	—
102	Do.	♀	152	—	—	—
103	Do.	—	143	—	—	—
104	Do.	—	138	—	—	—
105	Do.	♀	158	—	—	Gravid. Contained one egg 16 mm. long. Nos. 105 to 111 found beneath leaves, &c., when clearing drains.
106	Do.	—	138	—	—	—

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.					
107	June 8	—	138	—	—	—
108	Do.	—	138	—	—	—
109	Do.	—	143	—	—	—
110	Do.	—	132	—	—	—
111	Do.	—	132	—	—	—
112	June 10	♀	158	—	—	Gravid. Contained one egg.
113	Do.	♀	152	—	—	Gravid. Contained one egg.
114	Do.	—	143	—	—	Nos. 106 to 112 found when clearing drains.
115	Do.		143	—	—	—
116	Do.	—	143	—	—	—
117	Do.	—	138	—	—	—
118	Do.	—	138	—	—	—
119	June 16	—	152	—	—	An earthworm in stomach.
120	Do.	—	125	—	—	—
121	Do.	—	75	—	—	—
122	July 13	—	152	108	24	—
123	Aug. 1	♀	138	110	21	Gravid. Contained one egg.
124	Aug. 18	♀	152	111	22	Gravid. Contained two eggs.
125	Aug. 29	♀	164	109	?	Gravid. Contained one egg 18 by 4·6 mm.
126	Do.	♀	158	109	22	Gravid. Contained one egg 18 by 4·6 mm.
127	Do.	♀	152	112	22	Gravid. Contained one egg 18 by 4·6 mm.
128	Do.	♀	152	105	22	Gravid. Contained one egg 18 by 4·6 mm.
129	Do.	♀	112	106	21	Gravid. Contained one egg 15·5 by 4·6 mm.
130	Do.	♀	152	111	22	Gravid. Contained one egg 15·5 by 4·6 mm.
131	Do.	♂	—	101	30	Nos. 125 to 134 found with over a dozen eggs (not of this species) in various heaps of sand.
132	Do.	♂	—	104	26	—
133	Do.	♂	—	106	27	—
134	Do.	♂	—	107	25	—
135	Aug. 31	♂	138	107	30	Found under a stone.

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.					
136	Aug. 31	♀	152	112	21	Gravid. Contained one egg 15·5 mm. long.
137	Do.	♀	—	115	23	Nos. 136 to 139 found close together under sand and leaves.
138	Do.	♂	—	105	25	—
139	Do.	♀	—	104	23	—
140	Sept. 1	♀	125	116	22	Gravid. Contained one egg 18 by 4·6 mm.
141	Do.	♂	125	108	25	Nos. 140 to 143 found under earth and leaves.
142	Do.	♂	118	105	25	—
143	Do.	♂	118	109	27	—
144	Sept. 3	♀	—	110	22	Under large stone. Gravid. Contained one egg 15·5 by 3·5 mm.
145	Sept. 9	♀	143	114	22	Gravid. Contained one egg 18 mm. long.
146	Do.	♀	143	114	24	Gravid. Contained one egg 15·5 mm. long.
147	Do.	♂	125	106	28	Nos. 145 to 149 found close together under dead leaves.
148	Do.	♂ ?	82	113	26	—
149	Do.	♀	82	112	22	—
150	Do.	♀	143	114	22	Gravid. Contained one egg 18 mm. long.
151	Do.	♀	143	114	24	Gravid. Contained one egg 15 mm. long.
152	Do.	♂	125	106	28	Nos. 150 to 153 found close together under dead leaves.
153	Do.	♂ ?	82	113	26	—
154	Do.	♀	82	112	22	—
155	Do.	♀	138	110	20	Gravid. Contained one egg 18 by 4·6 mm.
156	Do.	♂	152	105	30	Nos. 155 to 158 all found close together under leaves.
157	Do.	♂	132	108	25	—
158	Do.	♂	68	102	27	—
159	Do.	♀	143	112	23	Gravid. Contained one egg 18 by 4·6 mm.
160	Do.	♂	118	106	25	—

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
161	Sept. 9	♀	143	111	?	Gravid. Contained one egg 6 mm. long.
162	Do.	♂	143	108	27	Nos. 159 to 162 found under rocks.
163	Sept. 11	♀	143	111	22	Gravid. Contained one egg 18 mm. long.
164	Do.	♀	143	113	24	Gravid. Contained one egg 18 mm. long.
165	Do.	♂	132	105	25	Nos. 163 to 165 found under rocks.
166	Do.	♀	158	110	20	—
167	Do.	♂	132	105	25	—
168	Do.	♀?	68	?	24	—
169	Do.	♀	143	111	22	Gravid. Contained one egg 18 mm. long.
170	Do.	♀	143	113	24	Gravid. Contained one egg 18 mm. long.
171	Do.	♂	106	105	25	Nos. 166 to 171 found under rocks.
172	Sept. 12	♂	118	107	27	—
173	Do.	♂	112	105	28	—
174	Do.	♂	106	106	31	—
175	Do.	♂	93	108	26	Nos. 172 to 180 all found under rocks.
176	Do.	♂	87	106	26	—
177	Do.	♂	81	107	28	—
178	Do.	♂	81	108	28	—
179	Do.	♀	118	113	23	—
180	Do.	♀	143	114	23	—
181	Do.	♂	82	108	28	—
182	Do.	♂	118	107	27	Nos. 182 to 187 found under rocks.
183	Do.	♂	112	105	28	—
184	Do.	♂	106	106	31	—
185	Do.	♂	93	108	26	—
186	Do.	♂	87	106	26	—
187	Do.	♂	82	107	28	—
188	Oct. 7	♂	138	110	27	Nos. 181 to 184 found under rocks and stones.
189	Do.	♂	138	104	?	—
190	Do.	♂	75	104	25	—
191	Do.	♀	75	115	25	—
192	Oct. 22	♂	152	110	30	Nos. 185 and 186 under stones and boulders.

Serial No.	Date.	Sex.	Length.	Ventrals.	Subcaudals.	Remarks.
	1921.					
193	Oct. 22	♂	112	109	27	—
194	Nov. 2	♀	125	112	22	—
195	Nov. 2	♂	122	106	27	—
196	Do.	♂?	122	103	?	—
97	Do.	♀	132	111	24	Gravid. Contained one egg 22 by 3·2 mm.
198	Do.	♀	135	110	20	Gravid. Contained one egg.
199	Do.	♀	143	112	18	Gravid. Contained one egg.
200	Do.	♂	68	108	30	Nos. 194 to 200 found under rotting leaves.
201	Nov. 5	♀	152	110	21	—
202	Do.	♀	143	108	25	—
203	Do.	♀	143	112	23	—
204	Do.	♂	132	105	33	—
205	Nov. 15	♀	152	—	—	Gravid. Contained one egg.
206	Nov. 19	♀	143	111	22	Gravid. Contained one egg.
207	Do.	♂	132	108	26	—
208	Do.	♂	118	104	27	—
209	Do.	♀	164	—	—	Gravid. Contained one egg.
210	Nov. 30	♂	164	105	26	—
211	Do.	♀	138	108	20	—
212	Do.	♂	128	108	27	Last four subcaudals divided.
213	Do.	♂	110	102	27	—
214	Dec. 12	♀	138	—	—	Gravid. Contained one egg.
215	Do.	♀	138	—	—	Gravid. Contained one egg.
216	Do.	♀	138	—	—	Gravid. Contained one egg.
217	Do.	♀	152	—	—	Gravid. Contained one egg.
218	Do.	♀	138	—	—	Gravid. Contained one egg.
219	Do.	♀	152	—	—	Gravid. Contained one egg.
220	Do.	♂	125	—	—	Nos. 214 to 223 found among loose soil and leaves.
221	Do.	♂	112	—	—	—
222	Do.	♂	100	—	—	—
223	Do.	♂	100	—	—	—
224	Dec. 17	♀	152		—	Gravid. Contained one egg 18 by 3·2 mm.
225	Do.	♀	143	—	—	Gravid. Contained one egg.
226	Do.	♂	125	—	—	—
227	Do.	♂	118	—	—	—

Serial No.	Date.	Sex.	Length.	Ventrals.	Subcaudals.	Remarks.
228	Dec. 18	♀	125	—	—	Nos. 228 to 230 found in drains.
229	Do.	♀	118	—	—	—
230	Do.	♀	143	—	—	Gravid. Contained one egg 18 by 3·2 mm.
231	Dec. 20	♀	132	—	—	Gravid. Contained one egg.
232	Do.	♀	125	—	—	Gravid. Contained one egg.
233	Do.	♀	138	—	—	Gravid. Contained one egg.
234	Do.	♂	118	—	—	—
235	Do.	♀	118	—	—	—
236	Dec. 24	♀	138	—	—	Gravid. Contained one egg 18 by 3·2 mm.
237	Do.	♀	138	—	—	Gravid. Contained one egg.
238	Do.	♂	118	—	—	—
239 to 258	Dec. 25 to Dec. 31	—	—	—	—	Twenty adults, including nine ♀, each containing one egg.

This series of 211 specimens sheds considerable light on the habits of the species.

Habits.—It secretes itself beneath boulders, stones, or leaves, but if such shelter is not available burrows into loose soil, or into the silt in drains.

Food.—Like other *Aspiduræ* it subsists on earthworms.

Breeding.—(*a*) *The Sexes :* Of 162 sexed, 73 proved to be ♂ and 89 ♀, so that the sexes are nearly balanced. Females usually attain the greater length. The male genitalia are not bifid, but are cylindrical organs beset with recurved spines in their distal three-fourths.

(*b*) *Method of Reproduction :* It is oviparous.

(*c*) *Season :* It is breeding during the whole year.

(*d*) *The Eggs :* These are very elongate, and before deposition measure about 18 by 4·6 mm. A single egg is the rule, but occasionally two are produced.

Growth.—(*a*) *The Hatchling :* Specimens which appear to have been recently hatched vary from 60 to 75 mm. in length (2 2/5 to 3 inches).

(*b*) *Early Life :* The annual growth cannot be estimated, as breeding occurs throughout the year.

(*c*) *Maturity :* The smallest egg-bound female was 112 mm. (4½ inches). If as is probable this species grows at the same rate as most other snakes, and doubles its length in the first year of life, the female is mature when one year old.

(*d*) *Maximum Length :* The largest measurement is 164 mm. (6½ inches).

Lepidosis.—(*a*) *Typical :* The ventrals vary from 101 to 118 (♂ 101 to 110, ♀ 105 to 118). The subcaudals range from 18 to 33 (♂ 25 to 33, ♀ 18 to 25).

(*b*) *Anomalies :* Rarely some of the last subcaudals are divided.

Genus DENDRELAPHIS.

Dendrelaphis tristis (Daudin.)

Serial No.	Date.	Sex.	Length in mm.	Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.	Ventrals.	Subcaudals.	Remarks.
	1921.								
259	Mar. 5	♀	1152	15	15	11	166	122	—
260	Mar. 6	♂	940	15	15	9	163	121	—
261	June 20	♂?	915	15	15	9	168	128	—
262	Sept. 30	♀?	1134	—	—	—	170	125	Killed in cattle shed.
263	Oct. 3	—	448	—	—	—	164	119	Found in plumbago pit.
264	Nov. 23	♀?	342	15	15	11	167	122	Apparently a hatchling.
265	Dec. 7	♀	897	15	15	11	171	125	Killed in a bush.
266	Dec. 8	♂	940	15	15	9	163	118	A skink in the stomach. Found on the ground among rubber trees.

Genus OLIGODON.

Oligodon arnensis (Shaw.)

One specimen 200 mm. long (8 inches) was killed on May 25, 1921. The loreal is absent on both sides. Ventrals 174. Subcaudals 41.

Oligodon tæniolatus (Jerdon.)

One juvenile specimen 118 mm. long ($4\frac{3}{4}$ inches) was sent me, but the label had become detached, and the date of capture is, therefore, unknown.

I have very good reason to believe that the date of capture of this specimen was September 3, 1921.

Oligodon sublineatus Dumeril & Bibron.

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1920.					
269	Oct. 4	♀	232	153	30	Gravid. Contained one egg 26 by 5 mm. Loreal confluent with nasal on right side.
270	Oct. 10	♂	232	139	32	—
	1921.					
271	Jan. 24	♂	200	139	38	—
272	Feb. 27	♂	188	134	39	A small egg of a lizard (or snake ?) in the stomach.
273	Mar. 3	♂ ?	225	139	36	—
274	June 9	♀ ?	212	147	28	—
275	July 2	♂	218	139	37	—
276	July 7	♂	206	140	37	—
277	Sept. 30	♂	238	140	36	Found under a stone.
278	Oct. 18	♀	250	154	26	—
279	Oct. 26	♀	238	152	29	Found under small rock.
280	Dec. 6	♀	232	153	31	In loose leaves in a drain.
281	Dec. 23	♂	240	137	37	Found under a stone.
282	Dec. 25 to 31	♀	200	152	30	—

Genus DIPSADOMORPHUS.

Dipsadomorphus ceylonensis Günther.

Serial No.	Date.	Sex.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.					
283	April ?*	♀	835	231	104	Gravid. Contained six eggs 27 by 11 mm., with minute embryos inside.
284	June 2	♂	586	230	111	Found on the ground. A *Calotes* lizard in the stomach.
285	Dec. 10	♀?	960	231	101	The costals are in 19 rows in all three specimens.

* The label was detached, but Mr. Phillips tells me this was taken in April, probably the first week.

Genus DRYOPHIS.

Dryophis mycterizans (Linné.)

Serial No.	Date.	Sex.	Length.	Costals.			Ventrals.	Subcaudals.	Remarks.
				Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.			
	1921.								
286	June 9	♀	1458	15	15	11	177	143	Gravid. Contained nine eggs, with small embryos about 610 mm. long.
287	July 26	♂	842	—	—	—	184	175	—
288	Aug. 11	♂	940?	—	—	—	183	?	Tail tip deficient.
289	Sept. 11	♀	1096	—	—	—	181	140	—
290	Sept. 14	♂	1028	—	—	—	183	193	—
291	Oct. 14	♂	928?	15	15	11	182	156	Tail tip deficient.

Dryophis pulverulentus (Dumeril & Bibron.)

Serial No.	Date.	Sex.	Length in mm.	Costals.			Ventrals.	Subcaudals.	Remarks.
				Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.			
	1921.								
292	Mar. 17	♂	1282	15	15	11	186	179	—
293	Oct. 5	♂	1122	—	—	—	182	173	Killed on rocky ground in rubber field.
294	Nov. 21	♂	1332	—	—	—	187	176	Killed near rocks in rubber field.
295	Dec. 26	♀	1380	—	—	—	—	—	On ground in rubber field. Loreals present (1 + 1). Gravid. Contained three eggs 32 mm. long, with no trace of embryos.

Genus BUNGARUS.

Bungarus ceylonicus Günther.

Serial No.	Date.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.				
296	Mar. 25	568	224	34	Under dead leaves in rubber field. 2nd and 3rd supralabials confluent on right side.
297	Mar. 26	542	227	32	Under dead leaves in rubber field. 2nd and 3rd supralabials confluent on left side.

Serial No.	Date.	Length in mm.	Ventrals.	Subcaudals.	Remarks.
	1921.				
298	June 7	368	224	38	—
299	Do.	380	—	—	—
300	June 8	398	231	36	—
301	Do.	380	224	36	—
302	Sept. 21	678	232	34	Killed at night crossing a path.
303	Nov. 12	548	229	37	An *Aspidura* in stomach, probably *guentheri*, as there are 15 costals posteriorly, and the subcaudals are 21, entire.

Genus NAIA.

Naia tripudians Merrem.

Serial No.	Date.	Length in mm.	Costals.			Ventrals.	Subcaudals.	Remarks.
			Two Head-lengths behind Head.	Midbody.	Two Head-lengths before Vent.			
	1921.							
304	June 19	442	25	23	15	189	59	—
305	Sept. 3	1002	25	23	15	187	59	—
306	Dec. ?	364	25	23	15	187	57	—

The two juvenile specimens are remarkable for the dark brown dorsal crossbars, about fifteen in number on the body, and the black ventral bars, the latter reducing in the depth of colour from before backwards. The adult is uniformly brown dorsally, but retains the ventral bars seen in youth.

Family VIPERIDÆ.

Genus ANCISTRODON.

ANCISTRODON HYPNALE (Merrem.)

Serial No.	Date.	Sex.	Length.	Ventrals.	Subcaudals.	Remarks.
	1920.					
307	Oct. ?	♂	368	152	45	—
308	?	♀	—	155	36	—
309	?	♀	262	149	36	—
310	?	—	355	—	—	—
	1921.					
311	May 25	♂	311	146	47	Found among leaves under a log.
312	June 5	♀	368	146	36	—
313	June 10	♀	184	146	33	—
314	June 21	♀	355	148	35	—
315	June 22	♂	362	149	45	—
316	June 30	♂	430	159	47	—
317	July 2	♀	336	150	38	—
318	July 5	♀	355	146	36	—
319	July 16	♀	405	149	38	Found in roof of Sinhalese house.
320	Sept. 21	♀	405	151	39	—
321	Nov. 4	—	330	147	33?	Tail tip deficient
322	Nov. 10	♂	380	148	45	Found in damp drain.
323	Nov. 16	♀	380	150	40	Gravid. Contained four eggs, probably infertile.
324	Nov. 20	♀	414	151	36	Under rock in rubber field.
325	Dec. 31	♀	397	146	39	Gravid. Contained three eggs about 12 mm. long. Found in heavy jungle.

Some light is thrown on the breeding season, the two gravid females being killed in November and December, both in an early stage of pregnancy.

Genus VIPERA.

VIPERA RUSSELLI (Shaw.)

A single specimen, 622 mm. in length, was killed on October 10 while crossing a path in a rubber field in the middle of the morning. The ventrals are 175, and subcaudals 51.

A LIST OF THE MAMMALS OF CEYLON.

By W. W. A. Phillips, F.Z.S.

ORDER : PRIMATES.

Sub-order : Anthropoidea.

FAMILY : Cercopithecidæ.

Macaca ferox (the Lion-tailed Monkey).

1. *Blanford No. 5, *Macacus silenus.*—A specimen in the British Museum said to have come from Ceylon. Does not seem to be known in the Island.

Macaca sinica (the Toque Monkey).

2. Blanford No. 11, *Macacus pileatus.*—Sinhalese, Rilawa ; Tamil, Kurangu; the Red Monkey. Peculiar to Ceylon. Found in the jungles all over the Island, both in the low-country and hills. Common.

Pithecus priam (the Madras Langur).

3. Blanford No. 14, *Semnopithecus priamus.*—Sinhalese, Vandaruwa ; Tamil, Mundi ; the Gray Wanderoo. Common in the jungles in the Northern, North-Central, Eastern, Uva, and Southern Provinces as far round as Ranna. Not found in the west of the Island. Common in parts of South India.

Pithecus kephalopterus (the Purple-faced Monkey).

4. †Blanford No. 17, *Semnopithecus cephalopterus.*—Sinhalese, Kalu Vandaruwa ; Tamil, Mundi ; the Low-country Wanderoo. Peculiar to Ceylon. Common in, and confined to, the jungles of the Western, Southern, and Sabaragamuwa Provinces and ascending into the hills to Adam's Peak.

Note.—A white monkey, *Semnopithecus senex*, of Blanford, has been found in the Island, chiefly in the hills near Matale and near Baddegama in the Southern Province. It was

* "Fauna of British India," Mammalia, Blanford.
† See additions and corrections at end.

recorded by Captain Robert Knox in his book. No specimen has been procured for a number of years, and it is not known whether it should be regarded as a separate species or as a white variety of *P. kephalopterus*. There is a specimen in the Colombo Museum.

PITHECUS URSINUS (THE BEAR MONKEY).

5. Blanford No. 19, *Semnopithecus ursinus*.—Sinhalese, Maha Vandaruwa; Tamil, Mundi; the Up-country Wanderoo. Peculiar to Ceylon. Confined to the hills of the Central Province. Not uncommon in the jungles round the Horton Plains, Bopats, &c., but is persecuted by the Tamils for its flesh and skin.

Sub-order: LEMUROIDEA.

FAMILY : Lemuridæ.

LORIS TARDIGRADUS (THE SLENDER LORIS).

6. Blanford No. 27, *Loris gracilis*.—Sinhalese, Unahapuluwa; Tamil, Theivangu; the Ceylon Sloth. Peculiar to Ceylon. Found sparingly in the jungles or the low-country all over the Island. Has been recorded from near Kandy, but does not ascend the hills to any very great altitude.

ORDER: CHIROPTERA.

FAMILY : Pteropodidæ.

ROUSETTUS SEMINUDUS (THE CEYLON FRUIT BAT).

7. Blanford No. 137, *Xantharpyia amplexicaudata*.—Sinhalese, Wawula; Tamil, Vava. Peculiar to Ceylon. Found locally in various parts of the Island both in the low-country and hills, usually found in large colonies in big caves, but sometimes on trees.

PTEROPUS GIGANTEUS GIGANTEUS (THE COMMON FLYING FOX).

8. Blanford No. 134, *Pteropus medius*.—Sinhalese, Maha Wawula; Tamil, Peria Vava; the Flying Fox. Common all over the low-country wherever there is sufficient fruit, &c., for

it to feed on. Not so common in the south-east where there are large stretches of jungle and little cultivation. Very common round Kandy and up to Nawalapitiya, but rarely seen in the planting districts of Dimbula and Dikoya. Visits Bandarawela (4,012 feet) at night at certain seasons to feed on the flowers of the Gum trees. Spends the day in large colonies hanging from the topmost branches of some large tree. Found in many parts of the Indian Peninsula.

Cynopterus sphinx sphinx (the Southern Short-nosed Fruit Bat).

9. *Blanford No. 128, *Cynopterus marginatus*.—Sinhalese, Yakwawula, Wawula; Tamil, Vava; the Small Fruit Bat. Common nearly all over the Island, but uncommon in the Kalutara District. Ascends the hills to some 4,000 feet. Spends the day hanging inside Talipot palm leaves, in the seed-clusters of Kitul trees, or sometimes in holes in trees, either in small parties or singly. Is common all over the Indian Peninsula.

Cynopterus brachyotis ceylonensis (the Ceylon Short-nosed Fruit Bat).

10. Not in Blanford. Sinhalese, Wawula; Tamil, Vava. Peculiar to Ceylon. Only recorded from the Punduloya district (3,500 feet), Central Province.

FAMILY : Rhinolophidæ.

Rhinolophus rouxi rouxi (the Rufous Horseshoe Bat).

11. Blanford No. 150, *Rhinolophus affinis*.—Sinhalese, Podi Wawula; Tamil, Sinna Vava. Very common all over the low-country and probably in the hills too. Has been recorded from 4,500 feet. Found in large or small colonies in almost every cave, culvert, or abandoned plumbago pit, not already inhabited by some other species of bat. Also found in disused dwellings, barns, &c. Common in India.

* See additions and corrections at end.

Rhinolophus beddomei sobrinus (the Great Indian Horseshoe Bat).

12. Blanford No. 145, *Rhinolophus luctus*.—Sinhalese, Podi Wawula ; Tamil, Vava. Found very sparingly in the jungles of the low-country. Recorded from Kala Oya and Kalutara. Usually found singly or in pairs in caves or under overhanging rocks in some dark and secluded corner in the jungle. Found in South India.

Hipposideros lankadiva (the Large Malay Leaf-nosed Bat).

13. Blanford No. 161, *Hipposideros diadema*.—Sinhalese, Podi Wawula ; Tamil, Vava. Said to be quite common near Kandy where it lives in large colonies in caves, tunnels, &c., does not seem to have been recorded from any other locality in the Island. Found in the Central Provinces and Mysore in India.

Hipposideros speoris speoris (Sykes Leaf-nosed Bat).

14. Blanford No. 164, *Hipposideros speoris*.—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Common over most of the low-country. Lives in large colonies in caves, barns, godowns, &c. Not known whether it occurs in the hills. Common in Southern India.

Hipposideros brachyotus (the Dekhan Leaf-nosed Bat).

15. Blanford No. 163, *Hipposideros galeritus*.—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Fairly common over most of the low-country and recorded from Passara (3,000 feet) in the Uva hills. Lives solitary or in pairs and threes in small caves and under overhanging rocks. Found in Central India and Bengal.

Hipposideros atratus (the Ceylon Leaf-nosed Bat).

16. Blanford No. 166, *Hipposideros fulvus*.—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Very common over all the low-country. Not known if it occurs in the hills. Lives

in large or small colonies in caves, culverts, old plumbago pits, lofts of houses, &c., and more rarely in hollow kitul trees. Peculiar to the Island.

FAMILY : Megadermatidæ.

MEGADERMA SPASMA CEYLONENSIS (THE CEYLON VAMPIRE BAT).

17. Blanford No. 170, *Megaderma spasma.*—Sinhalese, Tutica or Kotikan Wawula ; Tamil, Vava ; the Long-eared Bat. Common in the north and western parts of the Island, very common in Kalutara. Not recorded from the hills. Lives in better built village houses, almost invariably choosing those with a tiled roof—hanging from the rafters. Sub-species peculiar to the Island.

LYRADERMA LYRA LYRA (THE INDIAN VAMPIRE BAT).

18. Blanford No. 169, *Megaderma lyra.*—Sinhalese, Tutica or Kotikan Wawula ; Tamil, Vava ; the Long-eared Bat. Not uncommon in Kalutara, found in small colonies in abandoned houses, caves, or disused plumbago pits. One recorded from Mannar found hanging on a tree, and a few from Colombo found in a house. Found in many parts of India.

FAMILY : Vespertilionidæ.

Sub-Family ; Vespertilioninæ.

PIPISTRELLUS CEYLONICUS CEYLONICUS (KELAART'S BAT).

19. Blanford No. 186, *Vesperugo ceylonicus.*—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Common in the hills, but rarely descends into the low-country. A few recorded from Kalutara, but not common. Very common in Dimbula and Dikoya, where it is practically the only bat seen flying about in the evening. Lives in small colonies in hollow trees and branches. Sub-species perculiar to Ceylon.

PIPISTRELLUS COROMANDRA (THE COROMANDEL PIPISTRELLE).

20. Blanford No. 187 (partim), *Vesperugo abramus.*—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Common in the lower Uva hills (3,000 feet) and in the low-country of the

Northern, Eastern, and Uva Provinces, but does not extend its range into the damper climate of the west coast. Lives in bungalow roofs, hollow trees, &c. Common in many parts of India.

Pipistrellus mimus mimus (the Southern Dwarf Pipistrelle).

21. Blanford No. 187 (partim), *Vesperugo abramus*.—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. The smallest bat in Ceylon. Common in the damper districts of the Western and Southern Provinces, and ascends the hills to Kandy. Lives in small colonies in the roofs of bungalows and other buildings ; and often enters houses. Common in many parts of India.

Hesperoptenus tickelli (Tickell's Bat).

22. Blanford No. 191, *Vesperugo tickelli*.—Sinhalese, Podi Wawula ; Tamil, Vava ; the Golden Bat. Locally distributed. Very common in Kalutara District and recorded from Anuradhapura. Uncommon in Passara (Uva, 3,000 feet). By day hides away in the jungles probably in hollow trees, &c. Found in Central India and Madras.

Scotophilus kuhli (the Common Yellow Bat).

23. Blanford No. 194, *Nycticejus kuhli*.—Sinhalese, Podi Wawula ; Tamil, Vava. Common round Colombo and in the palm belt along the coast of the Western and Southern Provinces, also recorded from Kurunegala and Elephant Pass. Lives in holes in walls and buildings, and possibly in the cadjan roofs of fishermen's huts. Very common in many parts of India.

Scotophilus wroughtoni (Wroughton's Bat).

24. Not in Blanford. Sinhalese, Podi Wawula ; Tamil, Vava. Recorded from Anuradhapura, but seems rare. Found in many parts of India.

LEUCONÆ HASSELTI (VAN HASSELT'S BAT).

25. Blanford No. 203, *Vespertilio hasselti*.—Recorded from Valachchenai Kokoputchi, and Anuradhapura. Found commonly in Java.

Sub-family: Kerivoulinæ.

KERIVOULA PICTA (THE PAINTED BAT).

26. Blanford No. 213, *Cerivoula picta*.—Sinhalese, Kirri Wawula ; Tamil, Segapu Vava ; the Red Bat. Uncommon. Has been recorded from Colombo, Veyangoda, Trincomalee, Peradeniya, and Kalutara. Usually found, two or three together, hanging in the dead leaves on a plantain tree. Found in the Indian Peninsula.

KERIVOULA HARDWICKEI (HARDWICKE'S BAT).

26A. Blanford No. 214, *Cerivoula hardwickii*. Given by Blanford as having been found in the Island, but not known definitely to occur.

Sub-family: Miniopterinæ.

MINIOPTERUS FULIGINOSUS (THE LONG-WINGED BAT).

27. Blanford No. 216, *Miniopterus sebreibersi*.—Sinhalese, Kirri Wawula ; Tamil, Sinna Vava. Fairly common in the hills of the Uva Province, also recorded from Wellawaya and Kurunegala. Seems to prefer a rather dry climate. Is not found in the damp Western Province. Found in Nepal and the Western Ghats.

FAMILY : Emballonuridæ.

TAPHOZOUS LONGIMANUS (THE LONG-ARMED SHEATH-TAILED BAT).

28. Blanford No. 220, *Taphozous longimanus*.—Sinhalese, Podi Wawula ; Tamil, Vava. Rather uncommon. As yet only recorded from the Kalutara District. Lives, generally solitary or in pairs (sometimes in threes), in the crowns of the tallest coconut palms, either crawling in behind the leaf stem, or hanging on to the trunk, behind a dead leaf.

TAPHOZOUS MELANOPOGON (THE BLACK-BEARDED SHEATH-TAILED BAT).

29. Blanford No. 218, *Taphozous melanopogon*.—Sinhalese Podi Wawula; Tamil, Vava. Only recently found in Ceylon; when a large colony was discovered living in a pile of rocks near Paiyagalla in the Kalutara District. Lives in crevices and crannies under over-hanging rocks. Found in many parts of India and the Malay Peninsula.

SACCOLAIMUS SACCOLÆMUS (THE POUCH-BEARING SHEATH-TAILED BAT).

30. Blanford No. 222, *Taphozous saccolæmus*.—Sinhalese, Podi Wawula ; Tamil, Vava. Common in many parts of the Island, but particularly so in Kalutara. Has been recorded from Passara (3,500 feet) in the Uva hills, but seems to be absent from Dimbula and Dikoya. Flies very high and swiftly. Lives usually in small colonies in hollow kitul palms and other trees. Also found in Java, Kanara, and Bengal.

Note.—One or two other species of bats may, and probably do, occur in the Island, but they have not yet been recorded with any certainty.

ORDER: INSECTIVORA.

FAMILY : Soricidæ.

FEROCULUS FEROCULUS (THE LONG-CLAWED SHREW).

31. Blanford No. 119, *Crocidura macropus*.—Sinhalese, Kuni-miya, Hik-miya ; Tamil, Mungi-yelli ; Shrew-mouse. Peculiar to Ceylon. Found round about Nuwara Eliya.

PACHYURA MONTANA (THE CEYLON HIGHLAND SHREW).

32. Blanford No. 117 (partim), *Crocidura murina*.—Sinhalese, Kuni-miya, Hik-miya ; Tamil Mungi-yelli ; Shrew-mouse. Found in the hills of the Central Province.

PACHYURA KANDIANUS (THE KANDY SHREW).

33. Blanford No. 117 (partim), *Crocidura murina*.—Sinhalese, Kuni-miya, Hik-miya; Tamil, Mungi-yelli; Shrew-mouse. Found in the hills of the Central Province. Recorded from Passara (3,000 feet), Uva; and Balangoda (1,750 feet), Sabaragamuwa.

PACHYURA CÆRULENS (THE GRAY MUSK SHREW).

34. Blanford No. 118, *Crocidura cærulea*.—Sinhalese, Kuni-miya, Hik-miya; Tamil, Sinna-yelli; Musk Rat. Quite common in Colombo; has probably been imported; rarely found far from human habitation.

Note.—The authorities at the British Museum have not yet finished revising and working out the genera and species of this family. There will probably be several alterations when more is known.

ORDER: CARNIVORA.

FAMILY : Felidæ.

FELIS PARDUS (THE LEOPARD OR PANTHER).

35. Blanford No. 30, *Felis pardus*.—Sinhalese, Kotiya, Diwiya (male only), Diwidena (female); Tamil, Pilli; the "Cheetah." Fairly numerous all over the more thinly populated parts of the Island, from the highest hills to the Sea coast, wherever there is enough jungle to afford it protection. Common generally throughout the Indian region.

FELIS VIVERRINA (THE FISHING CAT).

36. Blanford No. 35, *Felis viverrina*.—Sinhalese, Andhun-diwiya; Tamil, Koddy-pilli; the Tiger Cat. Found sparingly in the jungles all over the Island, both in the hills and low-country, but rarely seen. Has been recorded from many parts of India.

FELIS RUBIGINOSA (THE RUSTY-SPOTTED CAT).

37. Blanford No. 37, *Felis rubiginosa*.—Sinhalese, Wal-ballala; Tamil, Kadu-puna; the Wild Cat. Fairly common

in jungles all over the Island. Is usually found in small patches of heavy jungle, near habitations. Fairly common in South India.

FELIS AFFINIS (THE JUNGLE CAT).

38. Blanford No. 41, *Felis chaus*.—Sinhalese, Wal-ballala, Kalla-diwiya ; Tamil, Kadu-puna ; the Jungle Cat or Wild Cat. Not uncommon in the northern and dry parts of the Island, rarely found south of Colombo, does not appear to ascend the hills. Occurs in many parts of India.

FAMILY : Viverridæ.

Sub-family : Viverrinæ.

VIVERRICULA MALACCENSIS (THE SMALL INDIAN CIVET).

39. Blanford No. 48, *Viverra malaccensis*.—Sinhalese, Urulaewa ; Tamil, Poolu Puna ; the Civet Cat. Common all over the Island, in patches of scrub and jungle. Found all over India, Burma, and the Malay Peninsula.

PARADOXURUS NIGER (THE INDIAN TODDY CAT).

40. Blanford No. 51, *Paradoxurus niger*.—Sinhalese, Uggadewiya ; Tamil, Marum Nai ; the Palm Cat. Common all over the Island. Lives in hollow trees, bungalow roofs, and in holes under rocks. Common in South India.

PARADOXURUS AUREUS (THE CEYLONESE PALM CIVET).

41. Blanford No. 53, *Paradoxurus aureus*.—Sinhalese, Kalawedda ; Tamil, Segapu Marum Nai ; the Golden or Red Palm Cat. Somewhat rare in most parts, but found sparingly all over the Island. Fairly common in Bogawantalawa. Often lives in bungalow roofs. Peculiar to Ceylon.

Sub-family : Herpestinæ.

HERPESTES LANKA (THE COMMON CEYLON MONGOOSE).

42. Blanford No. 60 (partim), *Herpestes mungo*.—Sinhalese, Mukatiya ; Tamil, Kiri or Kiri Pullie ; the Mongoose. Occurs only in the dry Northern Zone where it is not uncommon.

In the west is not found much south of Anuradhapura, though in the east it extends its range down to Palutupana in the Hambantota District. Peculiar to Ceylon.

HERPESTES FLAVIDENS (THE CEYLON BROWN MONGOOSE).

43. Blanford No. 63, *Herpestes fulvescens*.—Sinhalese, Mukatiya; Tamil, Kiri or Kiri Pullie; the Mongoose. Common all over the damper districts of the Island, both in the hills and low-country. Is very common in the planting districts of Dikoya and Dimbula, both among the tea and in small patches of scrub fern. Is not found in the dry Northern Provinces, where its place is taken by the preceding species. Peculiar to Ceylon.

HERPESTES SMITHI ZEYLANICUS (THE RUDDY MONGOOSE).

44. Blanford No. 61, *Herpestes smithi*.—Sinhalese, Hötambaya; Tamil, Kiri Pullie; the Big Mongoose. Fairly common in the jungles over most of the low-country, is more a jungle-loving species than the last. Ascends the lower hills to about 3,000 feet. Is very often seen in pairs in the daytime. Subspecies peculiar to Ceylon.

HERPESTES VITTICOLLIS (THE STRIPE-NECKED MONGOOSE).

45. Blanford No. 64, *Herpestes vitticollis*.—Sinhalese, Loco Mukatiya; Tamil, Kiri Pullie; the Badger Mongoose. Used to be fairly common in the higher hills of the Central Provinces; but seems to be rather dying out. Was not uncommon on the Horton Plains and Bopats a few years back. Is not uncommon in the Yala reserve. Is also found in the Nilgiri hills in South India.

FAMILY : Canidæ.

CANIS LANKA (THE CEYLON JACKAL).

46. Blanford No. 69, *Canis aureus*.—Sinhalese, Nariya, Hiwala; Tamil, Narri; the Jackal. Fairly common in most parts of the Island, particularly so in the Hambantota District, where it is comparatively tame. Peculiar to Ceylon.

FAMILY : Mustelidæ.

Sub-family : Lutrinæ.

LUTRA LUTRA CEYLONICA (THE COMMON CEYLON OTTER).

47. Blandford No. 92, *Lutra vulgaris.*—Sinhalese, Diya-balla or Mudiya-balla ; Tamil, Nair-nai ; the Otter. Fairly common, but not very often seen, in the rivers, streams, lakes, and paddy fields all over the Island. Its presence can usually be discovered by its tracks in the mud. Sub-species peculiar to Ceylon.

FAMILY : Ursidæ.

MELURSUS URSINUS (THE SLOTH BEAR).

48. Blanford No. 100, *Melursus ursinus.*—Sinhalese, Wallaha (male), Waelahinni (female); Tamil, Karradie; the Bear. Fairly common in the large jungles of nearly all the low-country, except in the west and south-west. Not uncommon in the north-west above Puttalam. Does not usually ascend the hills to any great altitude; though in the drought some years ago one was seen in a jungle in the Bopats (5,000 feet), having, most probably, come up in search of water. Common in most of the jungles of the Indian Peninsula.

ORDER : RODENTIA.

Sub-order : SIMPLICIDENTATA.

FAMILY : Sciuridæ.

PETAURISTA LANKA (THE LARGE GRAY FLYING SQUIRREL).

49. Blanford No. 227 (partim), *Petaurista oral.*—Sinhalees, Hangu (Uva), Hambawa ; Tamil, ; the Large Flying Squirrel. Not common. Found occasionally in the heavy jungles of the south, from Ratnapura to the Yala Game Reserve. Is probably found in some of the jungles of the north and east too; but does not seem to have been recorded from there yet. Does not ascend the hills to any great altitude. Peculiar to Ceylon.

Pteromys (Petinomys) layardi (the Small Ceylon Flying Squirrel).

50. Blanford No. 237 (partim), *Sciuropterus fuscica-pillus*.—Sinhalese, Hambawa ; Tamil, . Rare. Has occasionally been caught in the jungles of Dimbula and Dikoya, round Great Western and above the Agras, has also been recorded from Wellawaya. Peculiar to Ceylon.

Ratufa macroura macroura (Pennant's Long-tailed Giant Squirrel).

51. Blanford No. 241, *Sciurus macrurus*.—Sinhalese, Dandulena ; Tamil, Peria Anil ; the Rock Squirrel. Fairly common in, and confined to, the heavy jungles of the Central hill range, round Hakgalla, Pattipola, and Bogawantalawa, &c. Is the only Giant Squirrel found in those forests. Sub-species peculiar to Ceylon.

Ratufa macroura melanochra (the Black and Yellow Giant Squirrel).

52. Blanford No. 241 (partim), *Sciurus macrurus*.—Sinhalese, Dandulena ; Tamil, Peria Carpu Anil ; the Rock Squirrel. Confined to the damp jungles of the west and south-west from the south side of Colombo to the Udugama district. Sub-species peculiar to Ceylon.

Ratufa macroura dandolena (the Common Ceylon Giant Squirrel).

53. Blanford No. 241 (partim), *Sciurus macrurus*.— Sinhalese, Dandulena ; Tamil, Male Anil, Peria Anil ; the Rock Squirrel. Common in the heavy forests of the south, from Ranna ; and round through the Uva and Eastern Provinces to the north, where it spreads over the jungles, as far south as Anuradhapura and Puttalam. Does not seem to ascend the hills. Has been found in Travancore, in South India.

FUNAMBULUS PALMARUM BRODIEI (THE NORTHERN CEYLON PALM SQUIRREL).

54. Blanford No. 253 (partim), *Sciurus palmarum*.— Sinhalese, Lena ; Tamil, Sinna Anil ; the Palm Squirrel. The common palm squirrel of the Northern Zone from about Kurunegala northwards. Sub-species peculiar to Ceylon.

FUNAMBULUS PALMARUM KELAARTI (THE LOWLAND CEYLON PALM SQUIRREL).

55. Blanford No. 253 (partim), *Sciurus palmarum*.— Sinhalese, Lena ; Tamil, Sinna Anil ; the Palm Squirrel. The Palm Squirrel of the eastern and southern low-country.

FUNAMBULUS PALMARUM FAVONICUS (THE SUB-MONTANE CEYLON PALM SQUIRREL).

56. Blanford No. 253 (partim), *Sciurus palmarum*.—Sinhalese, Lena ; Tamil, Sinna Anil ; the Palm Squirrel. The Palm Squirrel of the wet zone, *i.e.*, Kalutara, Galle, and Sabaragamuwa.

FUNAMBULUS PALMARUM OLYMPIUS (HIGHLAND PALM SQUIRREL).

57. Blanford No. 253 (partim), *Sciurus palmarum*.—Sinhalese, Lena ; Tamil, Sinna Anil ; the Palm Squirrel. Common in the hills, both in Dimbula and Dikoya, and in Uva. In the former districts it seems to be rapidly extending its range.

Note.—When more material is to hand and more is known about the seasonal changes of the Palm Squirrel, it is probable that it will be found necessary to revise the numerous sub-species, and do away with some altogether.

FUNAMBULUS LAYARDI (LAYARD'S STRIPED SQUIRREL).

58. Blanford No. 255, *Sciurus layardi*.—Sinhalese, Lena ; Tamil, Sinna Anil. Rare, confined to the Ratnapura and Balangoda Districts, where it lives in the tallest and biggest trees. Peculiar to Ceylon.

FUNAMBULUS KATHLEENÆ (THE NUWARA ELIYA GROUND SQUIRREL).

59. Blanford No. 256, *Sciurus sublineatus*.—Sinhalese, Lena; Tamil, Sinna Anil; the Little Ground Squirrel. Fairly common in the jungles and scrub round Nuwara Eliya and in the tea districts of the higher hills. Seems to prefer tangled bamboo brakes. Peculiar to Ceylon.

FAMILY: Muridæ.

Sub-family: Gerbillinæ.

TATERA CEYLONICA (THE CEYLON GERBIL OR ANTELOPE RAT).

60. Blanford No. 264, *Gerbillus indicus*.—Sinhalese, Welli-miya; Tamil, Vell-'yelli; the Sand Rat. Fairly common all over the low-country; but does not ascend into the hills. Lives solitary, in pairs, or in family parties, in burrows in sandy soil or in anthills. Is nocturnal and rarely seen by day. Peculiar to Ceylon.

Sub-family: Murinæ.

BANDICOTA MALABARICA (THE MALABAR BANDICOOT).

61. Blanford No. 296, *Nesocia bandicota*.—Sinhalese, Uru-miya; Tamil, Peritche-'elli; the Bandicoot. Not uncommon in swamps and gardens all over the Island, including the hills. Does considerable damage in kitchen gardens. Common in Central and Southern India.

GUNOMYS GRACILIS (THE CEYLON MOLE RAT).

62. Blanford No. 295, *Nesocia bengalensis*.—Sinhalese, Wel-miya; Tamil, Yelli; the Paddy Field Rat. Very common in the paddy fields of the low-country, and in the hills to almost the elevation of Kandy. Burrows into and along the paddy field bunds and does considerable damage to the villager's gardens. Peculiar to Ceylon.

RATTUS KELAARTI (KELAART'S RAT).

63. Blanford No. 272 (partim), *Mus rattus*.—Sinhalese, Miya; Tamil, Yelli, the Rat. Found in the hills only. Peculiar to Ceylon.

RATTUS RATTUS KANDIANUS (THE WHITE-BELLIED TREE RAT).

64. Blanford No. 272 (partim), *Mus rattus*.—Sinhalese, Gay-miya, Nera-miya (Uva); Tamil, Yelli; the Bungalow Rat. Very common all over the Island. The common bungalow rat. Peculiar to Ceylon.

RATTUS RATTUS NEMORALIS (THE LARGE CEYLON TREE RAT).

65. Blanford No. 272 (partim), *Mus rattus*.—Sinhalese, Nera-miya (Uva), Miya; Tamil, Yelli; the Rat. Found sparingly all over the Island, generally in scrub and brush-wood. Peculiar to Ceylon.

RATTUS RATTUS NORVEGICUS (THE COMMON BROWN RAT).

65A. Blanford No. 274, *Mus decumanus*.—Is not uncommon round by the docks in Colombo. Has been brought from Europe in the ships. Grows to a large size.

RATTUS BLANFORDI (THE WHITE-TAILED RAT).

66. Blanford No. 278, *Mus blanfordi*.—In August, 1920, two or three half-grown specimens of this species were taken on Dammeria Group, Passara (3,000 feet), in the Uva hills, where several others have been seen since. This is the only record of its having been found in Ceylon. Found in many places on the Indian Peninsula.

MILLARDIA MELTADA MELTADA (THE SOFT-FURRED FIELD RAT).

67. Blanford No. 290, *Mus meltada*.—Has been recorded from the low-country of the Southern and Uva Provinces only. Is found in the Central and Southern Provinces of India.

MUS DUBIUS (THE COMMON INDIAN HOUSE MOUSE).

68. Blanford No. 282, *Mus musculus*.—Sinhalese, Kosatta-miya ; Tamil, Sund'elli ; the Mouse. Common near human habitations all over the Island ; equally common all over India.

LEGGADA BOODUGA (THE SOUTHERN FIELD MOUSE).

69. Blanford No. 287, *Mus buduga*.—Sinhalese, Kosatta-miya; Tamil, Sund'elli; the Field Mouse. Found sparingly in the paddy fields all over the low-country. Common in Kalutara. Not recorded from the hills. Lives in holes in paddy field bunds, &c. Found over most of India.

CŒLOMYS MAYORI (MAYOR'S RAT).

70. Not in Blanford. A species belonging to an entirely new genus, peculiar to Ceylon, discovered by Major E. W. Mayor in 1913. Only recorded from Pattipola and the Horton Plains.

CŒLOMYS BICOLOR (THE BICOLOURED CŒLOMYS).

71. Not in Blanford. The low-country representative of *C. mayori;* also discovered by Major Mayor, only recorded from Kottawa in the Southern Province, where it seems to be rare.

VANDELEURIA OLERACEA ? (THE LONG-TAILED TREE MOUSE).

72. Blanford No. 270, *Vandeleuria oleracea*.—Sinhalese, Gaz-miya ; Tamil, ? ; the Tree Mouse. Very uncommon, has been found at Welimada, in the Yala Game Sanctuary, and in Kalutara on a few occasions only. Found in India.

GOLUNDA NEWERA (THE NUWARA ELIYA BUSH RAT).

73. Blanford No. 299 (partim), *Golunda ellioti*.—Sinhalese, Wel-miya ; Tamil, ? ; the Coffee Rat. Not uncommon both in the hills and in the southern and western low-country, but not often seen on account of its skulking habits. Was more common, and did much damage in the coffee days.

FAMILY : Hystricidæ.

ACANTHION LEUCURUS LEUCURUS (THE INDIAN PORCUPINE).

74. Blanford No. 315, *Hystrix leucura.*—Sinhalese, Ittewa ; Tamil, Mullum pandi ; the Porcupine. Fairly common all over the Island. Owing to the damage it does to young rubber plantations, gardens, &c., its numbers are kept down. Common in many parts of India.

Sub-order : DUPLICIDENTATA.

FAMILY : Leporidæ.

LEPUS SINGHALA (THE CEYLON HARE).

75. Blanford No. 319, *Lepus nigricollis.*—Sinhalese, Hawa, Tamil, Mossul ; the Hare. Common all over the Island wherever there is enough scrub in which to hide. Peculiar to the Island. The Ceylon representative of the Black-naped Hare of South India.

ORDER : ANGULATA.

Sub-Order : ARTIODACTYLA.

***Section* : Pecora.**

FAMILY : Bovidæ.

BUBALUS BUBALUS BUBALUS (THE WILD BUFFALO).

76. Blanford No. 342, *Bos bubalus.*—Sinhalese, Wal-haraka, Wal-mimea, Madiya (Bull) ; Tamil, Erume-mardu, Kardu-madu ; the Buffalo. Found in the heavy forests of the Southern, Uva, Eastern, Northern, North-Central, and North-Western Provinces, but does not ascend the hills. Was nearly wiped out some years ago by rinderpest ; but owing to strict protection for a number of years is again on the increase. Found wild in Assam and Central India.

FAMILY : Cervidæ.

Muntiacus malabaricus (the South Indian Muntjac or Barking Deer).

77. Blanford No. 362, *Cervulus muntjac.*—Sinhalese, Olua-muwa, Welli-muwa ; Tamil, Mann ; the Red Deer. Fairly common in the jungles all over the Island, but seems to prefer the patnas and small " tundus " of jungle on the slopes of the hills. Found in Southern India.

Axis axis ceylonensis (Ceylon Spotted Deer).

78. Blanford 368, *Cervus axis.*—Sinhalese, Tit-muwa ; Tamil, Pullie Mann ; the Spotted Deer. In herds in the jungles and scrub all over the more thinly populated parts of the low-country. Does not ascend the hills. Sub-species peculiar to the Island.

Hyelaphus porcinus (the Hog Deer).

79. Blanford No. 369, *Cervus porcinus.*—Sinhalese, Gona-muwa, Welli-muwa ; Tamil, Mann ; the Paddy Field or Swamp Deer. Found only in the Kalutara and Galle Districts on the west coast, from a few miles north of Kalutara to near Kottawa, west of Galle, extending inland only some twenty miles or so from the coast. Is fairly common in some of the swamps and patches of jungle between the paddy fields. Was most probably introduced many years ago, and is not indigenous to the Island. Does not occur in South India, but is found in Bengal and the North.

Rusa unicolor unicolor (the Sambhur).

80. Blanford No. 367, *Cervus unicolor.*—Sinhalese, Gona ; Tamil, Marri ; the " Elk." Scattered throughout the heavy forests of the whole Island from the highest peaks to the seashore. Common in the Indian forests where the antlers of the stag grow considerably larger than they do in Ceylon.

Sub-family : Moschinæ.

***Section* : Tragulina.**

Moschiola meminna (the Indian Chevrotain or Mouse Deer).

81. Blanford No. 371, *Tragulus meminna.*—Sinhalese: Meeminna, Wal-miya ; Tamil, Sarrugu Mann ; the Mouse Deer. Not uncommon in the jungles, large and small, all over the Island, often lives in the jungles and "cheddy" surrounding Sinhalese villages, is common round Colombo. Found in the jungles of South India.

FAMILY : Suidæ.

Sus cristatus cristatus (the Indian Wild Pig).

82. Blanford No. 374, *Sus cristatus.*—Sinhalese, Wal-ura ; Tamil, Kardu Pandi ; the Wild Pig. Common in suitable jungle and scrub all over the whole Island, seems specially common in some of the Uva hills. Found in most parts of India.

Note.—It may be that this species should be regarded as a sub-species peculiar to the Island *S. c. zeylonensis.*

Sub-order : Proboscidea.

Elephas maximus zeylanicus (the Ceylon Elephant).

83. Blanford No. 332, *Elephas maximus.*—Sinhalese, Aliya, Atha (tusker), Athini (cow) ; Tamil, Anei ; the Elephant. Common in the large forest tracts of the low-country, especially so in the low jungle round Hambantota. A few are still left in the main jungle round the Horton Plains and Bopats, but only number a dozen or so. This sub-species is said to be peculiar to the Island, the Indian elephant being *E. maximus maximus.*

ORDER : EDENTATA.

Sub-order : Squamata.

FAMILY : Manidæ.

Manis crassicaudata (the Indian Pangolin).

84. Blanford No. 399, *Manis pentadactyla.*—Sinhalese, Kaballæya; Tamil, Alungu; the "Ant-eater" or "Armadillo." Scattered all over the low-country, but nowhere very common; being strictly nocturnal is rarely seen unless stumbled upon at night. Is found in the Uva hills to 3,000 feet. Occurs in many parts of India.

ORDER : CETACEA.

Sub-order : Mystacocœti.

FAMILY : Balænidæ.

Balænoptera indica (the Great Indian Fin Whale).

85. Blanford No. 377, *Balænoptera indica.*—Occurs off the coast of Ceylon. One washed ashore near Ambalangoda in September, 1894. Grows to 80 or 90 feet, said to be the largest of all animals.

Sub-order : Odontocœti.

FAMILY : Physeteridæ.

Physeter macrocephalus (the Sperm Whale or Cachalot).

86. Blanford No. 379, *Physeter macrocephalus.*—Said to have been formerly much hunted off the coast of Ceylon. One stranded near Mannar in September, 1889.

Cogia breviceps (the Pygmy Sperm Whale).

87. Blanford No. 380, *Cogia breviceps.*—One washed ashore at Moratuwa in 1915, and preserved in the Colombo Museum. Wide distribution in the Indo-Pacific and Atlantic Oceans.

FAMILY : Delphinidæ.

Pseudorca crassidens (the Grampus or Lincolnshire Killer).

88. Not in Blanford. One washed ashore at Moratuwa in 1890.

? Lagenorhynchus obscurum (the Beakless Dolphin).

89. Blanford No. 387, *Lagenorhynchus obscurum*.—The skull of one taken in the Palk Straits is said to be in the Calcutta Museum.

Tursiops tursio (the Bottle-nosed Dolphin).

90. Blanford No. 388, *Tursiops tursio*.—One recorded from Puttalam. Probably found throughout the Seas of the world.

? Steno lentiginosus (the Speckled Dolphin).

91. Blanford No. 392, *Steno lentiginosus*.—A skull of one obtained at Aripo is in the Museum of the College of Surgeons.

Note.—A number of other Dolphins are found in the Indian seas, but have not been included, as they have not been actually taken off Ceylon.

ORDER : SIRENIA.

FAMILY : Manatidæ.

Halicore dugong (the Dugong).

92. Blanford No. 398, *Halicore dugong*.—Sinhalese, Talla mala ? Mudaura ? Taken occasionally in the lagoons off the north-west coast of Ceylon from Puttalam to Jaffna. Found also off the coast of Malabar, Andaman Islands, and the Mergui Archipelago.

Additions and Corrections.

Genus **Pithecus.**

More material having come to hand, Mr. Hinton of the British Museum (Natural History) has worked out anew the Western Ceylon forms of this genus and has come to the following decisions. The name *kephalopterus* having been preceded by the name *vetulus*, the true name of the black form of the species must be *P. vetulus vetulus ;* while the pale form he has called *vetulus phillipsi*, thereby necessitating the following alterations in the list.

No. 4. *Pithecus kephalopterus*, the Purple-faced Monkey, should read *Pithecus vetulus vetulus*, the Purple-faced Monkey. Peculiar to Ceylon. Common in troops in the jungles south of the Kalu-ganga, in Kalutara, and throughout all the south-western portion of the Island, to Balangoda in the north-east of its range and about Tangalla in the south-east.

Pithecus vetulus phillipsi, Sub-species peculiar to Ceylon. Found throughout the village jungles around Colombo and in the lower Kelani Valley; and southward to Horana and Panadure, the Kalu-ganga forming the dividing line between the territories of the two sub-species.

Genus **Cynopterus.**

After examination of new material, &c., Mr. Hinton has come to the conclusion that all the Ceylon specimens of this genus are referable to the one species *Cynopterus brachyotus ceylonensis*, and that the true *C. sphinx* is not found in the Island.

No. 9. *C. sphinx sphinx* must, therefore, be eliminated from the list.

St. George, March 5, 1923.

THE MUSCIDÆ TESTACEÆ OF THE ORIENTAL REGION.

(With descriptions of those found within Indian limits.)

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(*With eleven Plates.*)

THE "*Muscidæ Testaceæ*" of the Oriental Region have been the subject of three papers within recent years.

Bezzi (1911) followed Brauer and von Bergenstamm (1893), but subsequently discovered the errors into which he had been led by so doing, and revised matters in his paper of 1913 (Bezzi, 1913), which must form the basis of all subsequent work on the group.

However, in this paper he dealt specifically only with the species belonging to one of the included genera, *Bengalia*, and it was not until de Surcouf's Memoir of 1920 (Surcouf, 1920 *a*) that the group as a whole was revised. This revision has been actively criticised by Villeneuve, to which Surcouf replied (Surcouf, 1920 *b*).

Bezzi, in dealing with the species of *Bengalia*, has followed his usual practice of entirely ignoring the existence of species which he has been unable to recognize, and de Surcouf, in *Bengalia* in particular, has attempted no systematization of the species at all.

It is not the intention of the present paper to attempt to criticise de Surcouf's generic arrangement, his Memoir deals with the whole world, and so can only be adequately criticised in a discussion on world forms, though some of his new genera appear to be founded on very weak separatory characters, but his treatment of *Bengalia* appears to contain a misconception of the type species which is fundamental.

In regard to types, he undoubtedly appears to have had all the material required, but, like Bezzi, he appears to have suffered in his work through paucity of material in series—it is the price paid by the Museum worker in Europe for his enormous advantages in respect of type and literature accessibility.

De Surcouf made a great step in the right direction by recognizing that *Bengalia lateralis* Macquart, was not conspecific with *jejuna* Fb., in which Bezzi had sunk it, but his results in attempting to elucidate the two species are the reverse of my own.

It appears uncertain to which sex Fabricius' type of *jejuna* belonged, but it appears to be a female, and de Surcouf bases his whole separation of the two species on the Fabrician type and a female determined as *jejuna* by Macquart, and, as I shall show, the females of *jejuna* and *lateralis* are, by themselves, practically inseparable. The matter is not helped by Desvoidy's synonym *testacea*, of which the sex is not mentioned (the type, like most of that author's, appears to have perished), neither does Wiedemann's synonym, *torosa*, aid in determination, as the type of that species, again, is a female. As the type of the separated species, *lateralis*, is also female (de Surcouf illustrates the type itself on Plate II., fig. 1, stating in the explanation that it is female), it is necessary to try and separate two closely allied species on female specimens only.

De Surcouf attempts to solve the difficulty of separation by use of the marginal macrochætæ on the apparent third and fourth segments. He states that Fabricius' type and Macquart's determined specimen have these very strong, and that they are lacking in the type of *lateralis*, but it is just here that a series would have shown him the invalidity of this character, the macrochætæ vary in strength in almost every specimen, and if they are lacking, then his generic character, " always present," needs modification.

In his fitting of males to these types he appears to have gone on pure guess work, founded, apparently, on abdominal coloration. He " finds " the corresponding male of *jejuna* in the Museum collection from Java (page 36), though on

page 37 he remarks that he only " considers " this specimen to be the male of that species ! No account is given of the provenance of the specimen which is taken as the male of *lateralis* (page 37), which is unfortunate.

The presence of a second pair of posterior dorso-centrals in the type of *jejuna*, and their absence in that of *lateralis*, proves equally valueless, for, on his own showing, this pair is reduced, though, on the evidence of my own series of both species, its absence in the type of *lateralis* is the result either of reduction to absence in this particular specimen, or of damage (Macquart's types, I understand, are all in bad condition), for it can be distinguished in almost every specimen. As for abdominal coloration, in a series every graduation can be seen between strong marginal banding to the abdominal segments, and the entire absence of such.

No specimens *in cop.* appear ever to have come to hand, and without such the question can never be absolutely settled, but I consider that de Surcouf has got the two males reversed, and that the larger species, with distinct abdominal banding, has the male with the tibial armature 5 : 2, and the smaller species, with pale abdomen, only linear banded if at all, has the male with tibial armature 3 : 0, and de Surcouf's statement that the male with this arrangement is smaller than the Fabrician type bears this out.

The male genitalia are entirely different, as the figures show.

De Surcouf, beyond a bare mention of a few species on page 39 regarding chætotaxy in his generic description, ignores the existence of the other described species of the genus.

Bezzi (1913) tabulates the Oriental species known to him, showing that they fall into three groups :—

1.	*Abdomen without discal macrochætæ on apparent fourth segment*, hind tibiæ of male not shaggily haired, fore tibiæ armed	2
	Abdomen with discal macrochætæ on apparent fourth segment, hind tibiæ of male shaggily haired, fore tibiæ unarmed	Group III.

2. *Vibrissal angles high above mouth border*, cheeks fairly broad, genæ with many rows of hairs, mid frontal stripe thickly haired, *prelabrum strongly three-cornered, outstanding*, male fore tibiæ armed 3 : 2, claws very thin, almost bristle-like, parafacialia above without black fleck near base of antennæ, wings hyaline, scarcely somewhat yellowish. .. Group I.

Vibrissal angles exactly over mouth border, cheeks very narrow, genæ almost bare, mid frontal stripe shortly and diffusely haired, *prelabrum less projecting*, male fore tibiæ armed towards the middle, claws stronger, wings darkened .. Group II.

These would appear to be natural groups, all the African species falling into the third, but some of the subsidiary characters given for separating Groups I. and II. are very weak, others illusory. The position of the thorns in the tibial armature is of no value, likewise the presence or absence of the parafacial black spot, while the degree of hairiness of the mid frontal stripe and strength of the tarsal claws are subject to degrees of variation rendering them practically valueless. Two new species, presently to be described, however, break down the limits of the two main divisions as defined by Bezzi. Both have discal macrochætæ on the apparent fourth segment, but the hind tibiæ are not shaggily fringed in the males, while the fore tibiæ are armed. I consider the discal macrochætæ, a character common to both sexes, of more value than tibial adornment, and would therefore propose to group the species of the genus according to the characters italicized only. The position of none of the old species is altered, and my three new species fall into groups that they most resemble in their general facies. Group II., with very dark wings, is still apparently confined to the Philippines and Formosa.

Bezzi tabulated eight species, including two new ones, two without names, stating that one of the latter was probably

only a variety. Of these, he records three from the Indian sub-regions. We now know *latro* de Meijère, to be Indian also, making four of his seven known from our area, from which only a Philippine and two Formosan species are unrecorded. To these must be added the now separated *lateralis*, so that five species from the Indian area are defined in his and de Surcouf's papers. But van der Wulp (1896) records thirteen species (as *Ochromyia*), from the Oriental Region, to which must be added *varicolor* Fb.; *favillacea* Wlk.; and *obscuripennis* Bigot, described under other genera, making a total of sixteen species known from the region prior to the publication of new ones by Meijère and Bezzi.

Of these, *Ochromyia fulvescens* Big., is sunk by Surcouf in *Phumosia analis* Mq., though Bezzi suggests that it is a true *Bengalia* possibly identical with his " sp. incert. No. 1." *Ochromyia fasciata* Mq., is a *Zonochroa*, as is also probably *trifascia* Wlk., while the generic locations of the latter's *dioclea* and *spissa* are doubtful.

Fourteen Oriental species therefore remain as belonging to this genus (plus others now added), of which number half have not been definitely recognized in modern times. These are :—

Bengalia labiata R. D.	..	Bengal.
Bengalia pallens R D.	..	Bengal.
Bengalia melanocera R. D.	..	Bengal.
Ochromyia javana Mq.	..	Java.
Ochromyia bicolor Wulp.	..	Sumatra.
Homodexia obscuripennis Big.	..	Ceylon.
Anisomyia favillacea Wlk.	..	Celebes.

If de Surcouf is correct in sinking *fulvescens* in *Phumosia analis*, Bezzi's alternative suggestion that his " sp. incert. No. 1 " is *javana* Mq., if proved correct, reduces by one the number of unrecognized species. De Surcouf states that the latter is a true *Bengalia*, but, with the type and Bezzi's 1913 paper in his hand, does not follow up the suggestion.

In regard to the Indian sub-regions only, we are left with four unrecognized species, three by Desvoidy and one by Bigot. The descriptions of the first three are in a publication difficult

of access in India, and are herewith reproduced in full on the chance that some other worker, going over his collection with the present paper, may be able to recognize one or more of them. I have seen nothing like them myself. The description of *labiata* would in part fit *Caiusa indica* Surc., but that species, had it been known to Desvoidy, would almost certainly have been placed by him in his genus *Phumosia*. The blue tinge referred to in all of them is unlike anything known to me in *Bengalia*, a genus which contains no metallic species whatever.

BENGALIA LABIATA R. D.

Facie alba, frontalibus rubidis ; thorax rubide testaceus, dorso nigro-cyanescente ; abdomen testaceo-fulvo incisuris cyanescentibus ; alæ basi subflavescente.

Long : 5 lines. Face blanche ; antennes un peu brunes ; côtes du front bruns ; frontaux rougeatres ; corselet d'un testacé un peu rougeatre ; avec le dos noiratre cyané ; ecusson d'un fauve testacée ; abdomen d'un testacé fauve, avec le sommet des segmens un peu cyané ; pattes d'un testacé pâle ; cuillerons un peu obscurs ; ailes assez claires, un peu jaunatre à la base, et à nervures prononcées. Bengal.

BENGALIA PALLENS R. D.

Similior B. labiatæ ; testaceo pallidior ; thorax dorso scutelleque bruneis ; alis non flavescentibus.

Semblable au *B. labiata ;* corps d'un testacé plus pâle ; dos du corselet et ecusson bruns ; pattes pâles ; point de flavescent aux ailes. Bengal.

BENGALIA MELANOCERA R. D.

Cylindriformis ; antennis nigris ; fronte flavescente ; corpus rubricans ; thorax dorso nigricans ; abdomen zonis aut vittis transversis nigro-cyanescentibus ; pedes pallidi ; alæ subobscuræ.

Long : $4\frac{1}{2}$ lines. Cylindriforme ; antennes noires ; front flavescent ; face blanchatre ; corps rougeatre ; dos du corselet noiratre ; le sommet de chaque segment abdominal offre une ligne transversale d'un noir un peu cerulé. Pattes pâles, ayant un peu de brun ; cuillerons blancs ; ailes un peu obscures. Bengal.

Bigot's *obscuripennis*, placed in a genus otherwise exclusively American, is obviously *jejuna* or *lateralis*. The unique type is a female, so the point must always remain uncertain. From his "*abdomine . . . . incisuris nigris*" and "*alis infumatis*" I am inclined to refer it to *lateralis*, which has, on the whole, the wings a shade darker than *jejuna*, whilst the description of the abdomen would suggest more narrow black segmental margins than the bands found in typical *jejuna*. Poulton (1913), in recognizing the species as distinct in a non-systematic paper, gives no reasons for so doing, and there is absolutely nothing in Bigot's brief description which would not fit either of the older species.

Leaving *Bengalia*, we have only de Surcouf's work as a basis, and fortunately he has dealt with the remaining genera more fully, in regard to the species, than is the case with the former genus. Three other genera only are Oriental, *Phumosia*, *Caiusa*, and *Tricyclea* (sub-genus *Zonochroa*).

Van der Wulp lists five species of *Phumosia*, to which must be added *Calliphora papua*, Guérin, and *Ochromyia fulvescens* Big., which, as noted under *Bengalia*, is a synonym of *Ph. analis* Mq., recorded from New Holland, and not included in van de Wulp's catalogue. Bigot's *fulvicornis* is a *Cosmina*, belonging to the Rhiniinæ, not a Calliphorine at all, and so the genus stands thus :—

Phumosia abdominalis R. D. ..	Borneo, Philippines, Moluccas, &c.
Phumosia belvosii R. D. ..	? Timor.
Phumosia analis Mq. ..	New Holland, Moluccas.
Phumosia papua Guér. ..	New Guinea.
Phumosia papouana Big. ..	New Guinea.
Phumosia variegata Big. ..	New Guinea.

The genus is thus seen to be entirely Austro-Malayan, only entering the Indo-Malayan sub-region in its eastern limits in Borneo and the Philippine Islands, and does not concern us in India at all.

Caiusa is a new genus of de Surcouf's, very closely allied to *Phumosia*, and was erected with a single species, to which

another is added here, while de Surcouf reports another undescribed North Australian species in Bezzi's collection.

The African genus *Zonochroa* Br. & Bg., reduced by de Surcouf to a sub-genus of *Tricyclea* Wulp, is represented in the Oriental Region by *Ochromyia fasciata* Mq., from Java and possibly *trifascia* Wlk., from New Guinea, and does not appear in our limits. In addition to these genera I have found it necessary to erect a new genus, *Paradichosia*, for a new species from Sikhim, presently to be described, which is very close to *Adichosia* Surc., from the Australian Region, and *Paratricyclea* Villen., from the Ethiopian, and when the genera of the world again come under revision, may serve to unite all three under Villeneuve's name, with the definition slightly amended.

The five Oriental genera tabulate as follows :—

1.	Eyes separated in both sexes, frons hairy; always a prelabrum noticeable. Facial ridges bristly	*Bengalia* R. D.
	Eyes contiguous or separated in the male, frons generally bare, if hairy, so are the eyes; no prelabrum.	
	Facial ridges bristly or bare ..	2
2.	Facial ridges bare ..	3
	Facial ridges bristly ..	4
3.	Sternopleurals 2 : 1. Genal bristles strong	*Phumosia* R. D.
	Sternopleurals 1 : 1. Genæ with fine hairs only.. ..	*Caiusa* Surc.
4.	Sternopleurals 2 : 1. Eyes hairy	*Paradichosia* gen. nov.
	Sternopleurals 1 : 1. Eyes bare..	*Zonochroa* Br. & B.

BENGALIA.

Omitting the three unrecognized species by Desvoidy, the Indian species tabulate as follows :—

1.	Abdomen without discal macrochætæ on fourth segment ..	2
	Abdomen with discal macrochætæ on fourth segment ..	5

2.	Legs all yellow	3
	Legs with femora blackish ..	*jejuna var. quadrinotata* Big.
3.	Large species, fore tibia variously armed in male ..	4
	Small species, fore tibia of male with two pairs of thorns in the middle; male abdomen with two strong spines ventrally on apparent third segment ..	*hastativentris* sp. n.
4.	Abdomen usually strongly banded, male fore tibiæ armed 5 : 2 ..	*jejuna* Fb.
	Abdomen usually narrowly banded, male fore tibiæ armed 3 : 0 ..	*lateralis* Mq.
5.	Male hind tibiæ shaggily fringed ..	7
	Male hind tibiæ not shaggily fringed	6
6.	Abdomen blackish ..	*bezzii* sp. n.
	Abdomen yellowish	*surcoufi* sp. n.
7.	Abdomen yellow, narrowly black ringed; smaller species ..	*varicolor* Fb.
	Abdomen blackish, widely black ringed; larger species ..	*latro* Meij.

BENGALIA JEJUNA *Fabricius* (Plate I., Figs. 1, 2, 3, 6. Plate IV., ♂ genitalia).

Male, Female.—Head : frons in both sexes rather less than one-third width of head; ochreous brown, parafrontalia somewhat paler; face, especially parafacials, paler, their junctions with frons fairly distinct. Antennæ, first two joints ochreous, third darker; base of flagellum ochreous, as is also the proboscis. Palpi pale yellowish-white, with black bristles.

Thorax : mesonotum and scutellum ochreous brown, with paler lateral margins varying greatly in width and distinctness. Pleuræ paler.

Abdomen : pale brownish ochreous, the hind margins of the segments black banded, narrowly on the apparent first and fourth, more broadly (but varying greatly in width and marginal sharpness) on second and third, which have a median black

stripe which varies from well distinct, through only a faint brown coloration, to practically absent. The lateral margins of the second and third, and the whole of the fourth segment, may be shimmering whitish.

Legs ochreous yellow, the last three tarsal joints more or less blackened. Front tibia of male with five pre- and two post-median thorns. Mid femora spinose below apically in male.

Wings clear to slightly grayish. Squamæ yellowish-white with white cilia. Long : $11\frac{1}{2}$–13 mm.

Redescribed from six males and twelve females from Ceylon, at elevations varying from sea level to 4,200 feet, and one female from Banhar, N. Bihar (H. A. Inglis). It is probable that the unknown life-history covers a long period. The species is common during November and December, and I have two specimens taken in May ; it is entirely absent during the south-west monsoon months, the solitary exception being a female from Kandy on August 21, in the Colombo Museum collection. Dissection reveals that the species is oviparous.

Bengalia jejuna *var.* quadrinotata *Bigot.*

Male, Female.—Head : frons in both sexes about one-third the width of head, the parafrontalia more grayish ; face paler, parafacialia shimmering whitish. First two antennal joints brownish ochreous, third darker ; base of flagellum ochreous, as is also the proboscis. Palpi pale yellowish-white with black bristles.

Thorax : mesonotum and scutellum dull slaty-brown with very distinct pale lateral margins, with which the pleuræ are concolorous.

Abdomen pale yellowish-brown. Apparent first and second segments narrowly but distinctly black banded posteriorly, the third broadly but irregularly so, the colour extending on to the anterior margin of fourth. Sides of apparent second and third (sometimes all the latter) and all the fourth white shimmering.

Legs femora grayish-black, the lower surface of the posterior pairs more or less yellowish. Remainder yellow with darkened tarsal tips. Armature of male front tibiæ and mid femora exactly as in *jejuna*.

Wings clear, squamæ yellowish-white, with white cilia. Long : 10–13 mm.

The species described above runs to *quadrinotata* Big., by Bezzi's key. Though this was described from Ceylon I have never come across it there, the three specimens in my collection from which the foregoing was drawn up being from Banhar, N. Bihar (H. A. Inglis), being thus, like Bezzi's specimen, from North India. The male genitalia are identical with those of *jejuna*, of which it appears only to be a colour variety. In the single specimen in which the legs permit the examination of the hypoplural fan, this is found to consist of four bristles in an angled row.

BENGALIA LATERALIS *Macquart* (Plate I., Fig. 7. Plate V., ♂ genitalia).

Male, Female.—Head : frons slightly less than one-third of head, just appreciably narrower in the male, ochreous brown, parafrontalia somewhat paler, face, especially parafacials, paler. Antennæ with first two joints ochreous, third darker ; base of flagellum ochreous, as is also proboscis ; palpi pale yellowish-white with black bristles.

Thorax : mesonotum and scutellum ochreous brown, with paler lateral margins varying greatly in width and distinctness ; pleuræ paler.

Abdomen pale brownish ochreous, the hind margins of the apparent second and third segments very narrowly reddish-brown, of third and fourth very narrowly black. A not very distinct median reddish line on second and third. The fourth segment may be shimmering whitish.

Legs ochreous yellow, the apical darkening of the tarsi less distinct. Male front tibiæ with three premedian thorns only ; and mid femora spinose below, the range extending further and the individual spines stronger than in *jejuna*.

Wings clear to slightly grayish. Squamæ yellowish-white with white cilia. Long : 11–12 mm.

Redescribed from three males and one female from Suduganga, Ceylon, 1,386 feet, between December and April. The female is indistinguishable from some specimens of *jejuna*, but in life appears to stand higher on its legs, more Dexiid-like. As Surcouf points out, many of the modern records of *jejuna* possibly refer to this species, which is probably that illustrated as the former by Howlett, *Ind. Ins. Life.*, Plate LXIX., Fig. 4. The genitalia show strong distinctions from *jejuna*. As stated previously, Bigot's *obscuripennis* is probably synonymous with this species.

BENGALIA HASTATIVENTRIS *sp. nov.* (Plate II., Figs. 8, 9, 10, 13, 14. Plate VI., ♂ genitalia).

Male, Female.—Head: frons orange, darkened vertically, parafrontalia and margins of the ocellar triangle silvery-gray, paler brownish-yellow below, where the frontalia are narrower, face concolorous yellowish, parafacials whitish, as are genæ, the parafacials below the eyes appearing narrowly pale yellowish by contrast. Width of frons one-quarter of head. Prelabrum strongly projecting, the vibrissæ convergent above it.

Thorax : dorsum greenish-gray, with traces of median and admedian dark stripes ; scutellum concolorous, sides of both edged pinky-yellowish, and the whole of the humeral region thus coloured, the dorsal gray being greatly narrowed anteriorly. Pleuræ pale brownish.

Abdomen yellowish-brown, hind margins of apparent second and fourth segments very narrowly black. Venter similar. In male from hinder margin of apparent third segment in middle of ventral surface a pair of long, strong, black chætæ, closely appressed to the ventral surface arise and reach to tip of apparent fourth segment. Male genitalia concolorous with abdomen.

Legs yellow, tips of tarsi more or less blackened, hardly so in female. Male front tibiæ with four small black thorns near the middle. Mid femora with a short range of densely set spines near the middle.

Wings clear, slightly yellowish on fore border; squamæ pale yellowish-white. Long: 6–8 mm.

Described from a male and six females, all taken on windows, Suduganga, Ceylon 1,386 feet, between January and May of various years. Type male on March 26, 1921, in my own collection.

BENGALIA BEZZII *sp. nov.* (Plate I., Figs. 4, 5. Plate VII., ♂ genitalia).

Male, Female.—Head: frons less than one-third width of head, brownish, lateral margins apparently paler, face similar. First two antennal joints brownish-yellow, third darker; base of flagellum and proboscis brownish-yellow; palpi pale with black bristles. Prelabrum only slightly projecting, vibrissæ on the same level.

Thorax uniform ashy-gray, shoulders and humeral region brownish-yellow, pleuræ pale grayish.

Abdomen black, the whole, except the posterior margins of all segments and base of apparent first, shimmering grayish-white.

Legs: femora dark grayish, yellowish below, remainder pale yellowish with tarsal tips slightly blackened. Male front tibiæ with three premedian thorns, and mid femora spinose below apically.

Wings grayish, squamæ yellowish. Long: 8 mm.

Described from a male and two females, taken at Suduganga, Ceylon, 1,386 feet, in November to January, three specimens in four years only. Type male on January 20, 1920, in my own collection.

BENGALIA SURCOUFI *sp. nov.* (Plate II., Figs. 11, 12. Plate VIII., ♂ genitalia).

Male.—Head: frons less than one-third width of head; brownish with gray parafrontalia; face paler. First two antennal joints reddish-brown, third darker; base of flagellum and proboscis reddish-brown; palpi pale with black bristles. Prelabrum only slightly projecting, vibrissæ on the same level.

Thorax grayish, unmargined; pleuræ concolorous.

Abdomen brown, all segments black banded posteriorly, very narrowly on the apparent first, with a more or less well defined median stripe on the second and third.

Legs yellow, tips of tarsi darkened. Front tibiæ of male with a premedian range of about four small thorns, not at all noticeable; mid femora with a range of strong spines on apical third below.

Wings clear to very slightly grayish; squamæ pale yellowish. Long: 9 mm.

Described from three males from Mungpoo, Darjiling District, March to June, 1920, at elevations of 1,700 to 3,800 feet (G. E. Shaw). Type male on March 24, 1920, in my own collection.

I have much pleasure in dedicating this and the preceding species to the two workers to whose investigations we owe our modern knowledge of the genus.

BENGALIA LATRO *de Meijère* (Plate IX., ♂ genitalia).

Male, Female.—Head: frons one-third width of head, brownish with paler parafrontalia; face pale. First and second antennal joints reddish-brown, third darker; base of flagellum and proboscis reddish-brown; palpi pale with black bristles.

Thorax: dorsum and scutellum brownish-gray, paler at sides; pleuræ grayish.

Abdomen varying from all black with gray shimmer, leaving only posterior bands to all segments black, to a reddish-brown ground colour, covered with white shimmer, with black posterior bands.

Legs: femora varying from black, with front pair more or less yellow below, to all yellow, the paler legs being correllated with the paler abdomen; remainder of legs pale with tarsal tips darkened. Male front tibiæ with middle third minutely but distinctly spinulose, mid femora spinose below at apex, and hind tibiæ fringed.

Wings grayish, squamæ whitish. Long: 12–13 mm.

Redescribed from five males and four females from the jungle area of Ceylon in my own collection, and a small series from

Colombo in the Museum collection. Does not apparently ascend the hills at all, the highest locality recorded being Habarana (547 feet).

I have not been able to recognize *varicolor*, Fb., at all. Certain of the more reddish specimens of *latro* would run out as *varicolor* by Bezzi's key, but in the series all shades of leg and abdominal coloration can be seen, whilst the genitalia of the extreme forms are exactly similar. Size appears to be very constant, and as *varicolor* is described as a smaller species, I refrain from bringing *latro* under it, though I am of the opinion that such will ultimately prove to be the case.

From the foregoing descriptions it will be seen that the males of all species have the tip of the mid femur spinose below, the character being figured in the case of two of my new species where it is well pronounced. Thus, Bezzi's reference to it in his description of *escheri* brings to light that it is present in varying degree in all species. Another point brought out is that even species such as *latro*, described as having the male front tibiæ unarmed, show, under a high power, a distinct engrossment of the ordinary tibial spinules on some portion of the joint, so that it would certainly seem preferable to base the groups of the genus on the macrochætæ of the apparent fourth segment of the abdomen rather than on the adornment of the male tibiæ.

Caiusa.

The two species of this genus are closely allied, pale forms of de Surcouf's *indica* being somewhat difficult to distinguish from *testacea*, sp. nov., but typical species are amply distinct, and there is always some sign of mid dorsal thoracic darkening in *indica*. The genitalia of the two species are quite distinct, and exhibit such a different type of structure from that found in *Bengalia* that one is inclined to suspect that the group "*Muscidæ testaceæ*" is not so homogenous as Bezzi would have it; but until it has been possible for the genitalia throughout the family to be examined, the affinities of the various genera in this respect cannot be pronounced upon. An extended study of this nature I hope to have time to undertake at some future date.

CAIUSA INDICA *de Surcouf* (Plate X., ♂ genitalia).

Male, Female.—Head: male holoptic for half distance between vertex and root of antennæ, frontal triangle black, parafrontalia dark gray; about six frontals present. Antennæ with basal joints testaceous, third grayish, arista all testaceous, plumosity thicker basally above than elsewhere, and almost absent basally below. Palpi and rostrum of proboscis pale yellow, haustellum black. Upper facets of eyes much larger than lower, the junction occurring at about the level of the second antennal joint, not well defined. Female frons less than one-third width of head, black with ashy parafrontalia; two exterior frontals of which the lower is the strongest. Face gray, a little yellow near epistomal margin, parafacialia silvery. Antennæ rather darker than in male. Otherwise as in male.

Thorax: testaceous, mesonotum with a varying amount of black on disc, always leaving broad testaceous lateral margins. There may be some violet tinge in the black, which is usually shining. Sometimes a narrow median line separates the discal black into two broad stripes, and the intensity of infuscation varies greatly, especially in the male, but is never quite absent. Scutellum testaceous, sometimes slightly infuscated basally. Pleuræ testaceous.

Chætotaxy: acrostichals 2 : 2, dorso-centrals 2 : 4, humerals 3, posthumerals 3, presuturals 1, notopleurals 2, supra-alars 2 : 1, post-alars 2, a mesopleural fan, sternopleurals 1 : 1, hypopleurals about 4 in an angled row, scutellars an apical, 3 marginal and a pre-apical pair.

Abdomen testaceous, the apical and sometimes the apparent third segment with a varying amount of black, if shining, with usually a violet tinge, if dull, not so. No definite markings.

Legs testaceous, tarsal tips slightly darkened.

Wings clear, veins yellow, fore margin not tinged. Squamæ yellowish. Long: 6–7½ mm.

Redescribed from seven males and four females from Colombo, on various dates and years, in the Museum collection, and one female from Sudu-ganga in December. The males were mostly taken sitting on tips of leaves of the wild date palm.

The specimens seen by me exhibit certain differences from de Surcouf's description, drawn up from a single specimen of each sex. In my specimens vein III. is not bristly below beyond the node, and there are other slight chætotactic differences. The abdominal colour appears variable.

CAIUSA TESTACEA *sp. nov.* (Plate XI., ♂ genitalia).

Male, Female.—Head : male holoptic on middle third of frons, frontal triangle black, parafrontalia ashy, about six frontals. Face yellowish-gray, parafacialia more silvery-ashy ; no carina. Antennæ orange, third joint darkened apically. Flagellum with base orange and remainder black. Palpi orange, with black bristly hairs. Upper eye facets larger than lower, but without line of demarcation. Female frontal width about one-quarter of head, frons black, parafrontalia ashy, not clearly margined above, where the colours blend. Inferior exterior frontal much stronger than the superior. Third antennal joint all darkened. Otherwise as in male.

Thorax and scutellum testaceous, darker in female, with a little silvery pollen on anterior margin, through which sometimes show two submedian lines for a short distance, which do not reach the suture. Pleuræ concolorous, paler than the dorsum in the darker female ; sternopleuron with some silvery pollen on lower half. Chætotaxy as in *C. indica* Surc.

Abdomen concolorous with thoracic dorsum, unmarked.

Legs testaceous, the tarsi slightly darkened apically.

Wings clear, fore margin yellowish. Third vein bristly about half way to anterior cross vein above, below only on basal node. Squamæ yellowish. Long : 5½–7½ mm.

Described from a male from Emelina Estate, Maskeliya district (4,200 feet), on window, April 3, 1919 (N. K. Jardine), type ; a female from Suduganga, Matale District, also on window, May 31, 1920, allotype ; and four co-types in the Colombo Museum collection, three males from Kandy, August 19, 1914, and a female from Niroddumunai, Trincomalee District, February 12, 1914. Type and allotype in my own collection.

Though the specimens are not before me, this is almost certainly the species bred by Mr. Ballard, Government Entomologist, Madras, from the egg masses of a frog. These specimens are now with Major Patton.

PARADICHOSIA *gen. nov.*

Male : eyes closely approximated for half the distance between the ocellar triangle and the base of antennæ, sparsely pubescent. Verticals crossed, long; about five strong frontals. Frontal lunule nearly as wide as the length of the second antennal joint, which is rather less than one-third the length of the third, which has the apex rounded and the posterior edge somewhat more curved than the anterior. Arista plumose nearly to tip, the hairs of equal length on each side, but much more dense on the upper side basally than elsewhere. Cheeks about one-third the height of an eye. Facial ridges bristly, extending upwards to level of middle of third antennal joint, the vibrissæ arising half way between epistome and tip of antennæ, with one noticeably larger bristle immediately above them. Genal row of many bristles, extending nearly to back of head below the eye, intermingled with hairs of about the same length. Postocular row distinct on upper half of eye, and back of head with numerous fine hairs. Palpi elongate claviform. Proboscis somewhat elongated, the haustellum twice as long as the rostrum, strongly chitinized, the labella small.

Thorax : chætotaxy-acrostichals 2 : 3, dorso-centrals 2 : 3, posthumerals 3, humerals 3, notopleurals 2, supra-alars 2 : 2 (the posterior weak), intra-alars 2, postalars 3 (the interior weak), propleural 1, with a decumbent tuft of bristles below it, mesopleuron with hinder marginal fan of about 8, and some hairs along upper margin and upper half of anterior margin, pteropleuron with some weak bristly hairs, sternopleurals 2 : 1 ; hypopleuron with an angled row of about 8 ; scutellars, an apical (lightly crossed), 3 marginal and a pre-apical pair.

Abdomen with strong marginals to second apparent segment laterally, and on all of third and fourth segments, the latter also with irregular discals.

Wings : costal spine weak. First vein bare, third bristly on basal node only above and below. Last section of fourth vein concave exteriorly. Squamæ bare.

Genotype : *Paradichosia scutellata* sp. nov.

This genus is intermediate between *Adichosia*, de Surcouf, and *Paratricyclea*, Villeneuve, the former being Australian and the latter Ethiopian. It is distinguished from the former by the sternopleurals 2 : 1, and from the latter by the pubescent eyes.

PARADICHOSIA SCUTELLATA *sp. nov.* (Plate III).

Male.—Head : frontal triangle elongate, black, lightly striated superiorly-inferiorly ; base of antennæ fulvo-rufous. the third joint grayish, darker on outer margin, except basally, Palpi bright yellow with long, black bristly hairs, proboscis very dark brown. Eyes with upper facets slightly larger than the lower ones, without a line of demarcation between them, the weak pubescence pale. All bristles black.

Thorax : dorsum very dark gray, with ill-defined ashy lateral margins. Viewed from in front a median and subdorsal broad black stripes, ill-defined, fading away posteriorly, and widely interrupted at the suture, behind which they are very indistinct ; between the median and subdorsals on each side a pair of fine black lines presuturally. Pleuræ dark gray, prothoracic stigma bright fulvo-rufous. Scutellum with the basal two-thirds dark gray, the marginal third fulvo-rufous.

Abdomen : the first apparent segment black, the remainder grayish pollinose with black spots and lines, *Sarcophaga*-like.

Legs (damaged) : fulvo-rufous, tarsi blackened. Long bristles on hind femora below and hind tibiæ above, a very noticeable one at two-thirds the length of the latter.

Wings slightly smoky, the fore margin yellowish. Squamæ smoky-brown with yellow cilia. Long : 8 mm.

Described from a unique male in fair condition taken at Mungpoo, Darjiling District, between 3,900 and 5,200 feet, on February 5, 1920, by Mr. G. E. Shaw of the Government Cinchona estates, to whom I am greatly indebted for many specimens of diptera from this locality.

As noted by Villeneuve for the related *Paratricyclea stabulans* Bezzi, this species has the appearance of an Anthomyid.

In conclusion I would thank Major Patton, Lecturer in Medical Entomology, Edinburgh ; Mr. Bainbrigge Fletcher, Imperial Entomologist ; and Mr. Brunetti, of the Indian Museum, for help in respect of literature, without which it would have been impossible for this study to have been undertaken by an isolated worker in the tropics.

References.

Bezzi (1911). Boll. Lab. Zool. Portici, VI., 75–79.

Bezzi (1913). Entom. Mitteil. Bd., II., pt. 3, 70–78.

Brauer & von Bergenstamm (1893). Denk. K. Akad. Wien, LX., 89 *et seq.*

Poulton (1913). Proc. Ent. Soc. Lond., 1913, cxxviii-cxxix.

De Surcouf (1920 *a*). Nouv. Arch. Mus. Hist. Nat. Paris, Ser. V., No. 6, 27–117.*

De Surcouf (1920 *b*). Bull. Soc. Ent. France, November, 1920, No. 15, 249–251.

van der Wulp (1896). Cat. Descr. Diptera S. Asia, 152.

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* The date of publication of this Memoir, which will always be of great importance, does not appear on the face of the publication itself. Major Patton informs me that the Author, in a letter to Mr. E. E. Austen of the British Museum, states that it was completed at the moment of the outbreak of the great war, but was not published until 1920.

Explanation of Plates.

Plate I.

1. *Bengalia jejuna* Fb., ♀
2. *B. jejuna* F., ♂ head, front view.
3. *B. jejuna* F., ♂ head, side view.
4. *B. bezzii* sp. n., ♂ front tibia.
5. *B. bezzii* sp. n., tip of ♂ mid femur.
6. *B. jejuna* F., ♂ front tibia.
7. *B. lateralis* Mq., ♂ front tibia.

Plate II.

8. *Bengalia hastativentris* sp. n., ♂.
9. *B. hastativentris*, ♂ head, front view.
10. *B. hastativentris*, ♂ head, side view.
11. *B. surcoufi* sp. n., ♂ front tibia.
12. *B. surcoufi* sp. n., tip of ♂ mid femur.
13. *B. hastativentris* sp. n., ♂ front tibia.
14. *B. hastativentris* sp. n., ♂ abdomen.

Plate III.

Paradichosia scutellata gen. & sp. nov., ♂

Plate IV.

Bengalia jejuna Fb., ♂ genitalia.

Plate V.

Bengalia lateralis Mq., ♂ genitalia.

Plate VI.

Bengalia hastativentris sp. nov., ♂ genitalia.

Plate VII.

Bengalia bezzii sp. nov., ♂ genitalia.

Plate VIII.

Bengalia surcoufi sp. nov., ♂ genitalia.

Plate IX.

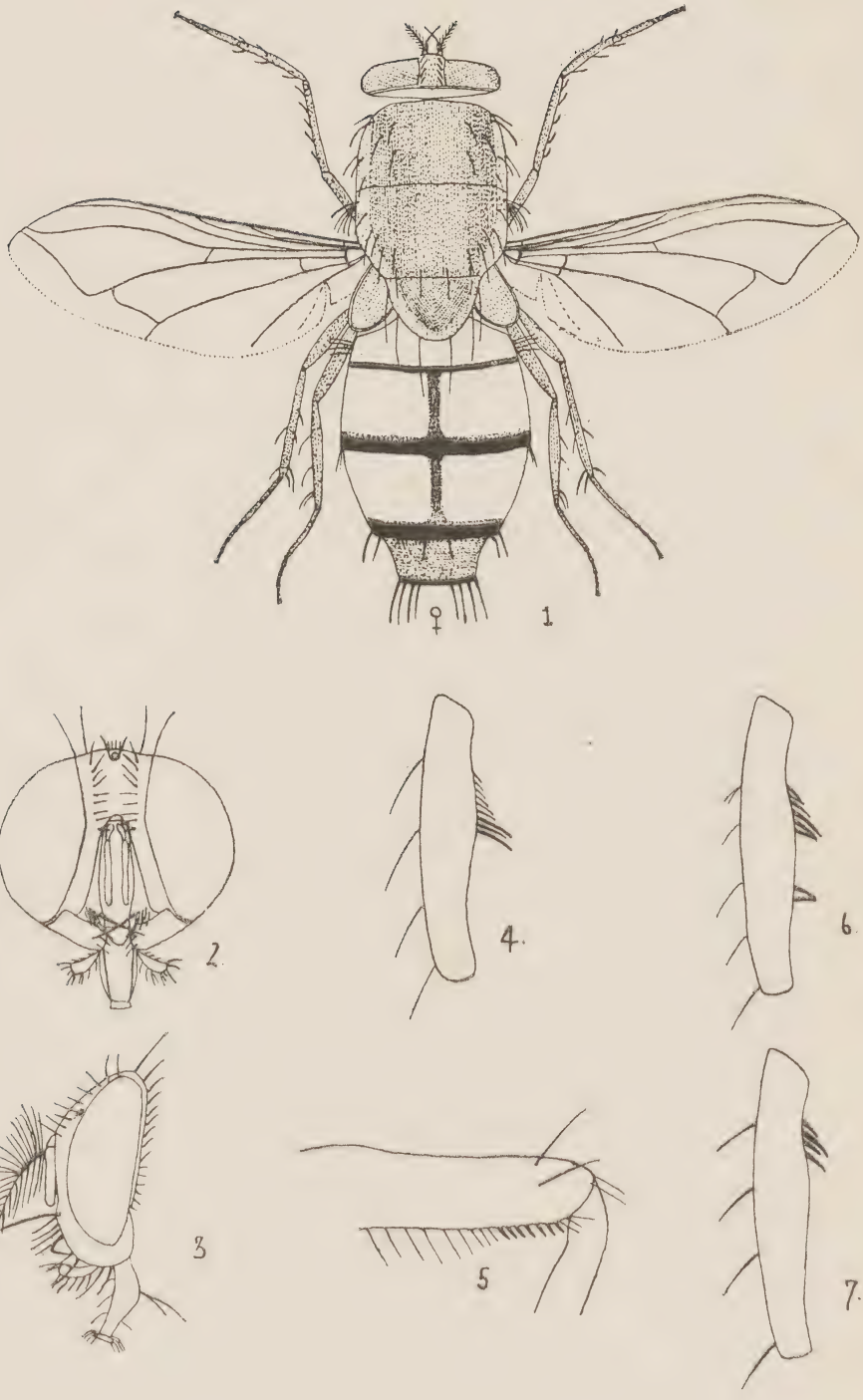
Bengalia latro Meij., ♂ genitalia.

Plate X.

Caiusa indica Surc., ♂ genitalia.

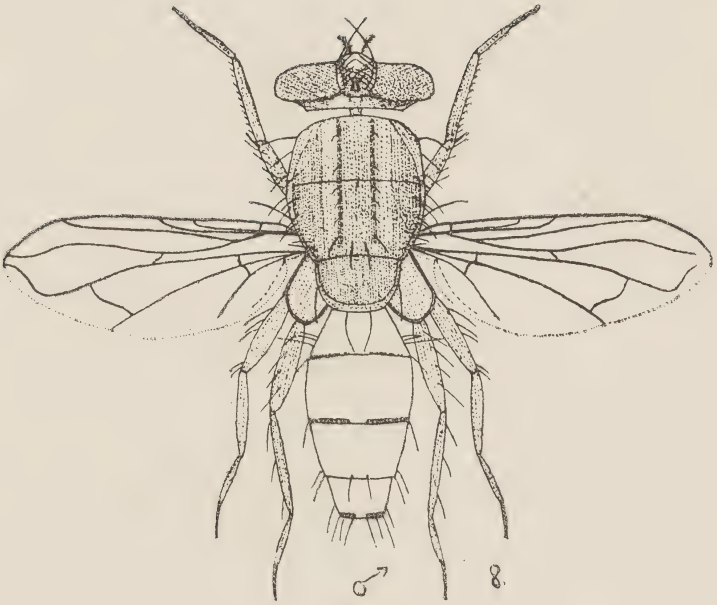
Plate XI.

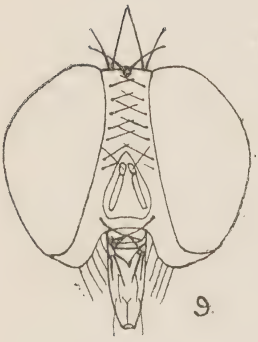
Caiusa testacea sp. nov., ♂ genitalia.

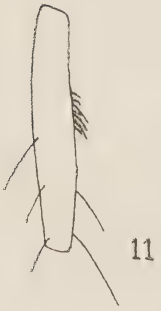


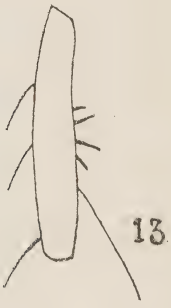
1, 2, 3, and 6 *Bengalia jejuna.*
4 and 5 *B. bezzii.*
7 *B. lateralis.*

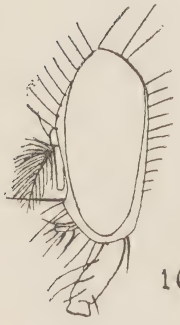
R. A. Senior-White, *del.*

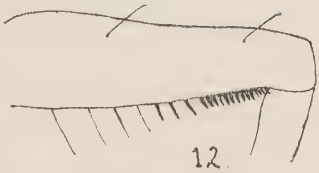


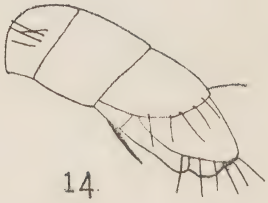






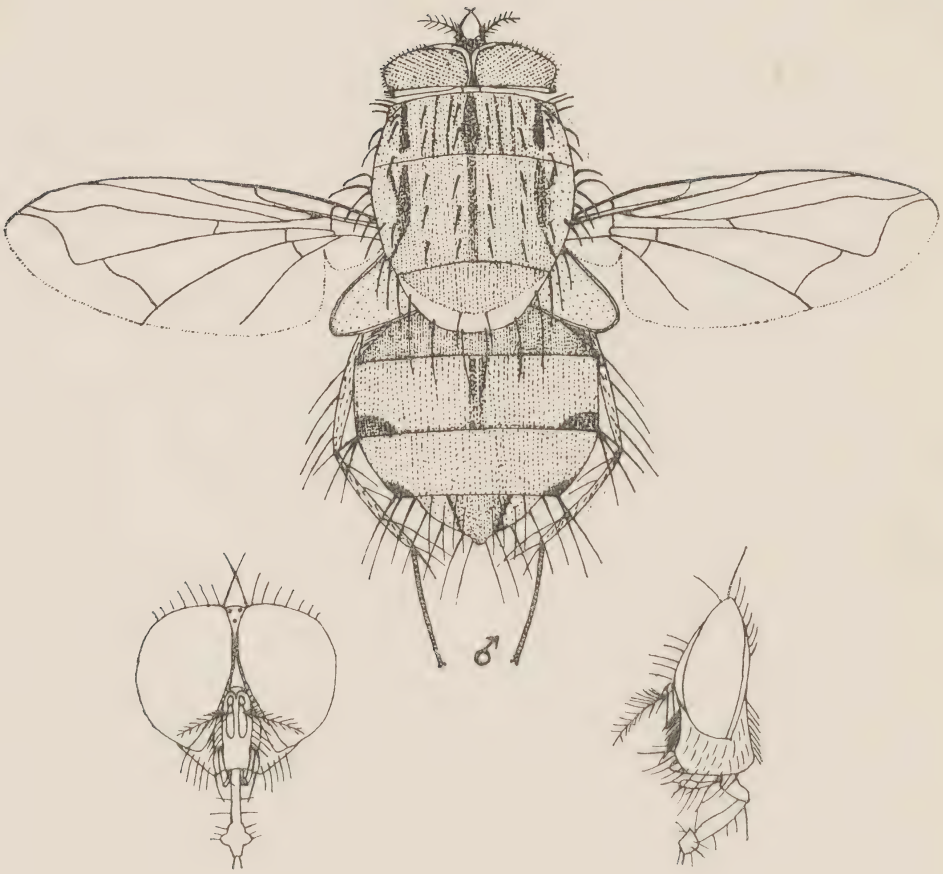






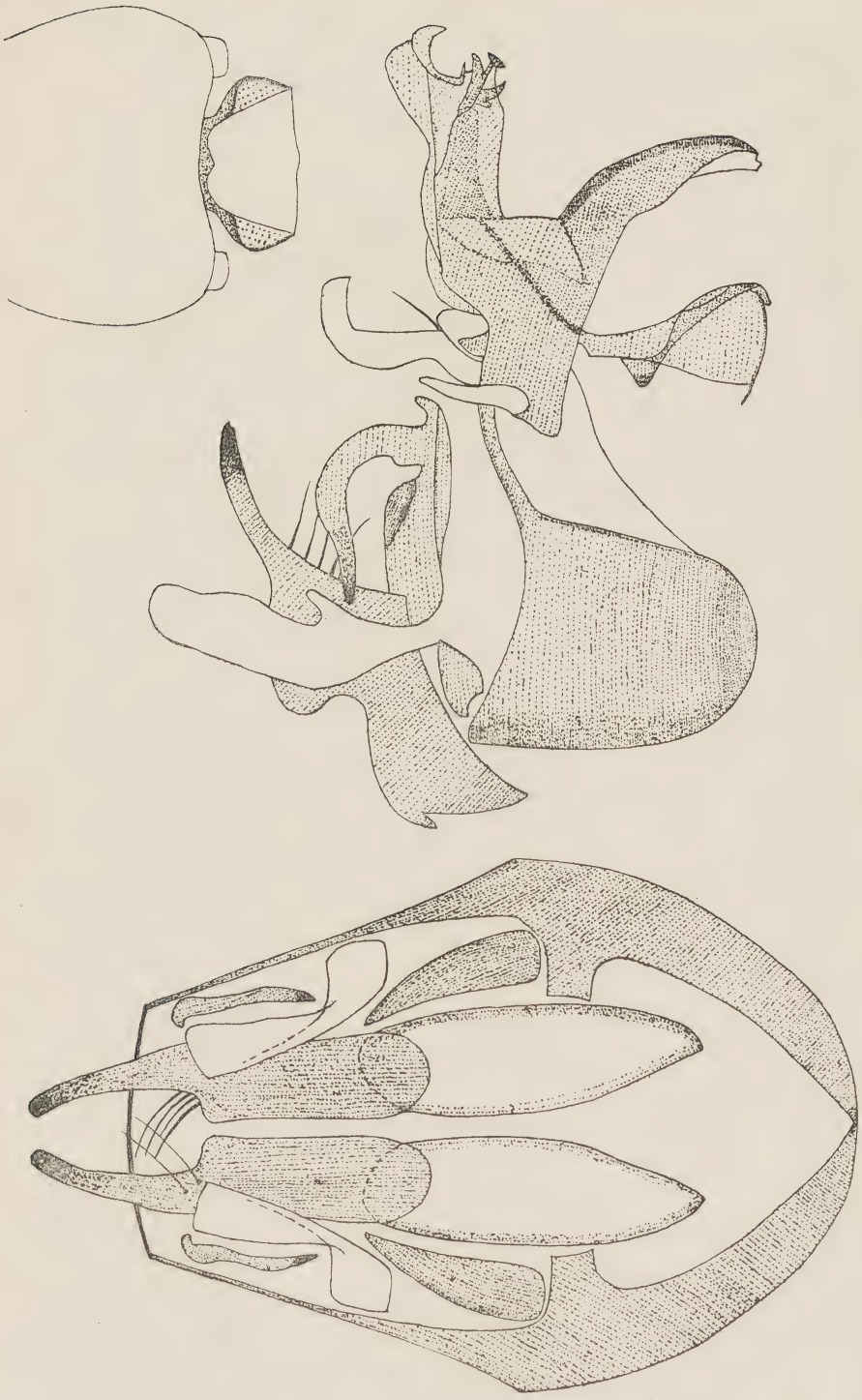
8, 9, 10, 13, and 14 *Bengalia hastativentris.*
11 and 12 *B. surcoufi.*

R. A. Senior-White, *del.*



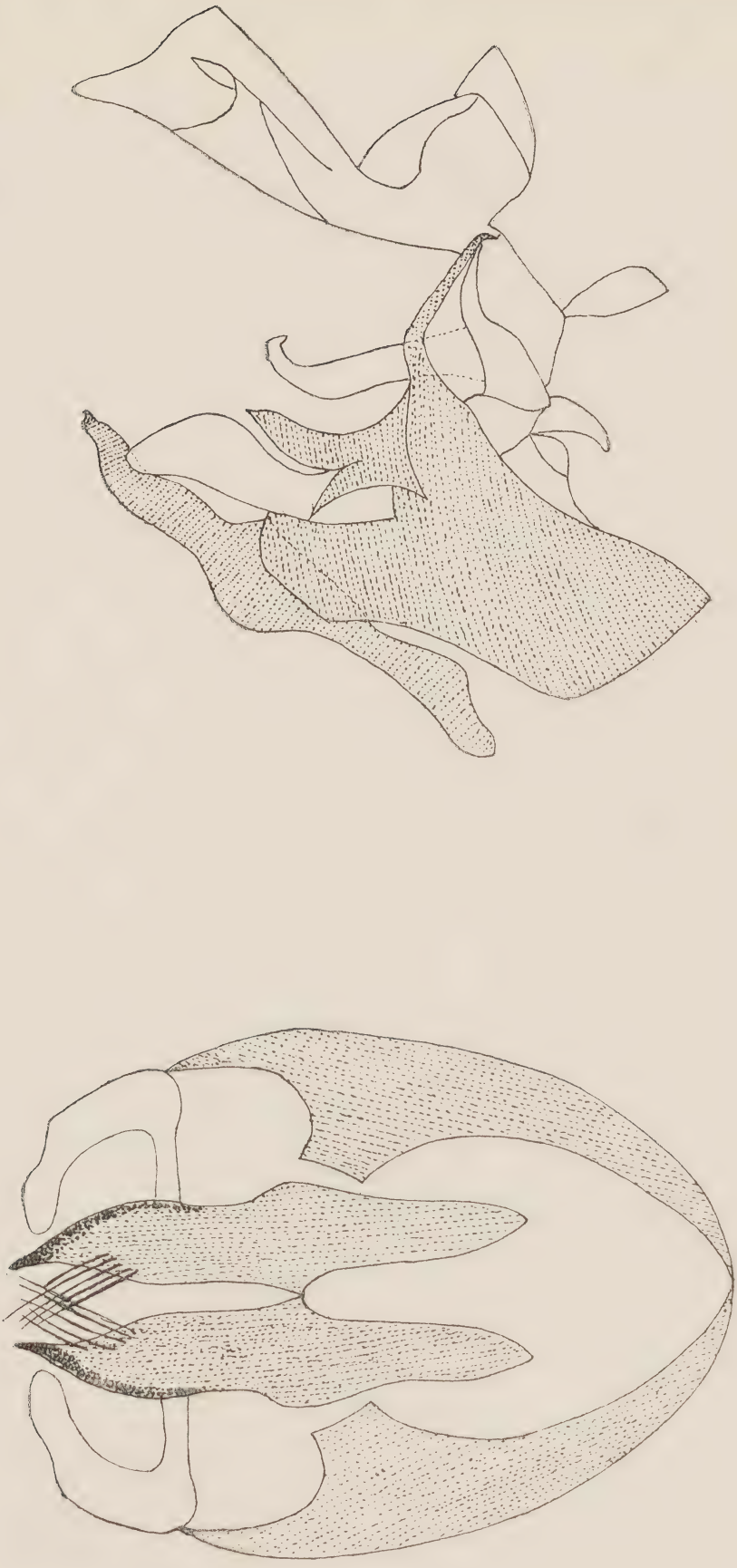
Paradichosia scutellata.

R. A. Senior-White, *del.*



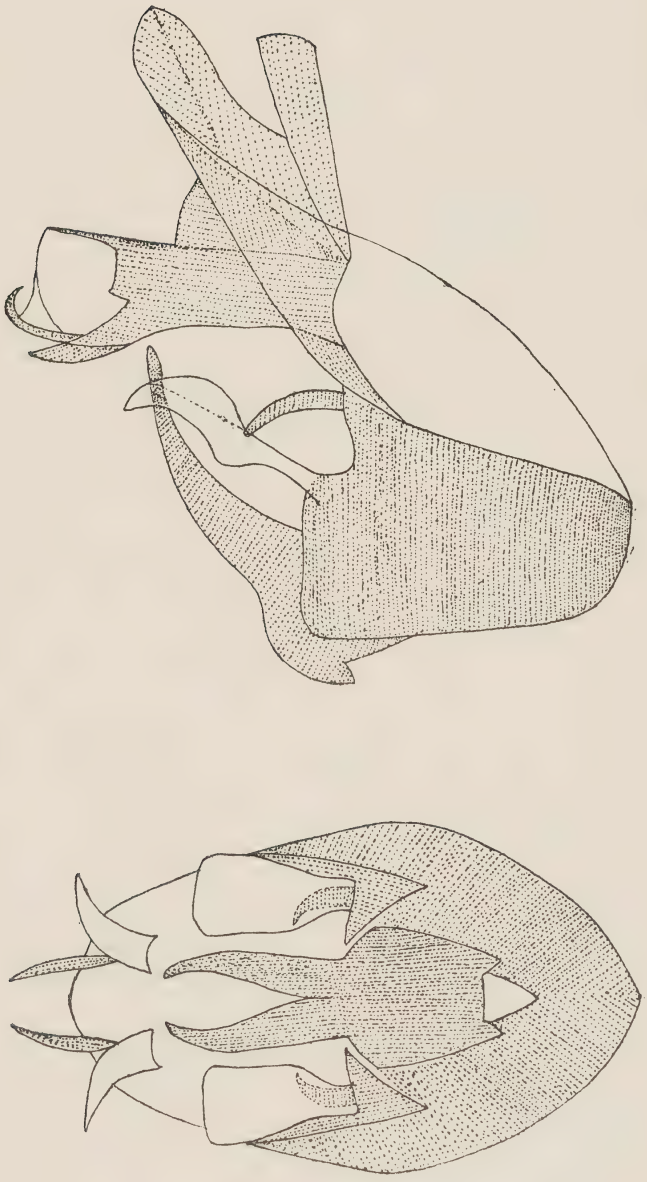
Bengalia jejuna.

R. A. Senior-White, *del.*



Bengalia lateralis.

R. A. Senior-White, *del.*

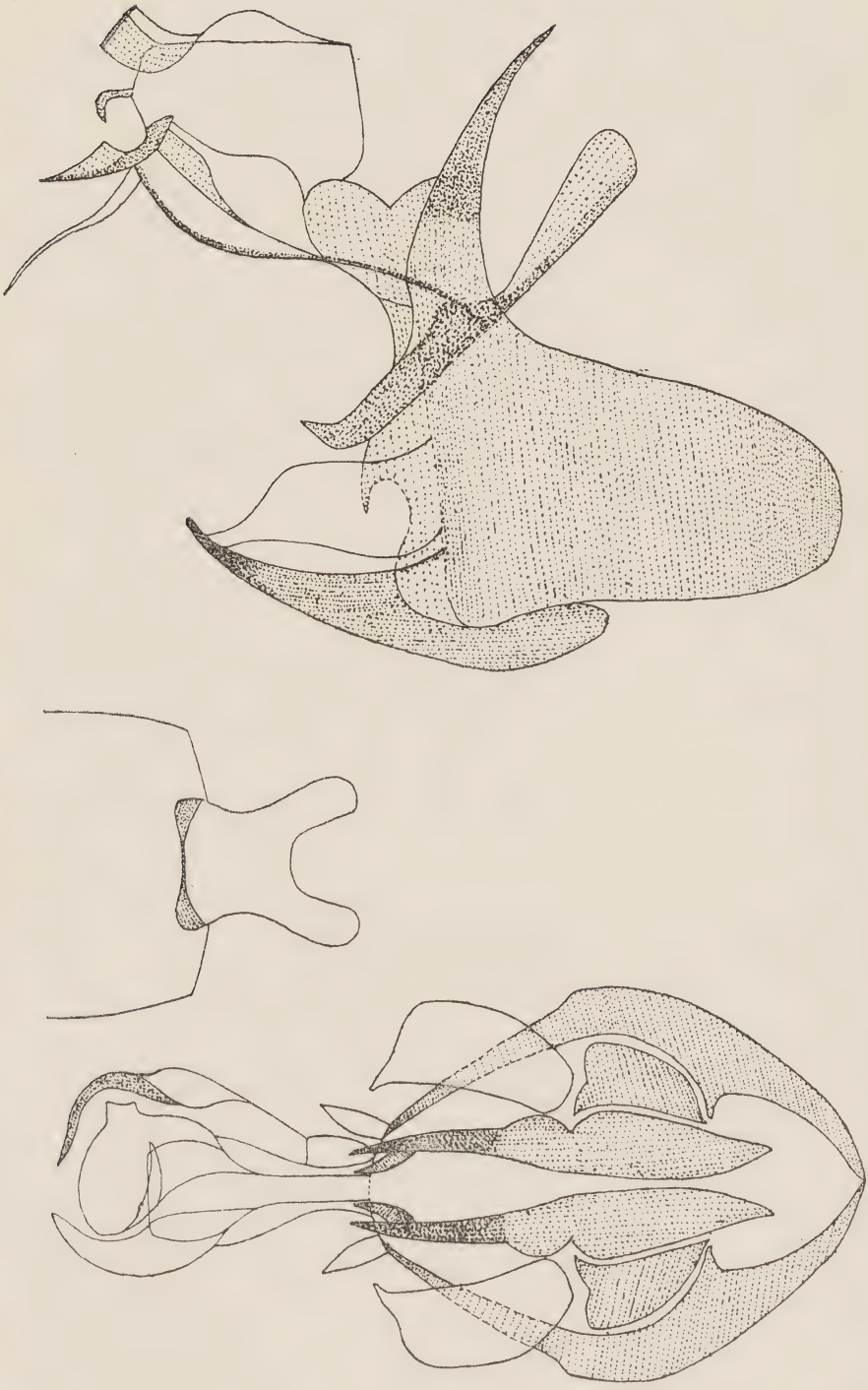


Bengalia hastativentris.

R. A. Senior-White. *del.*

Bengalia bezzii.

R. A. Senior-White, *del.*

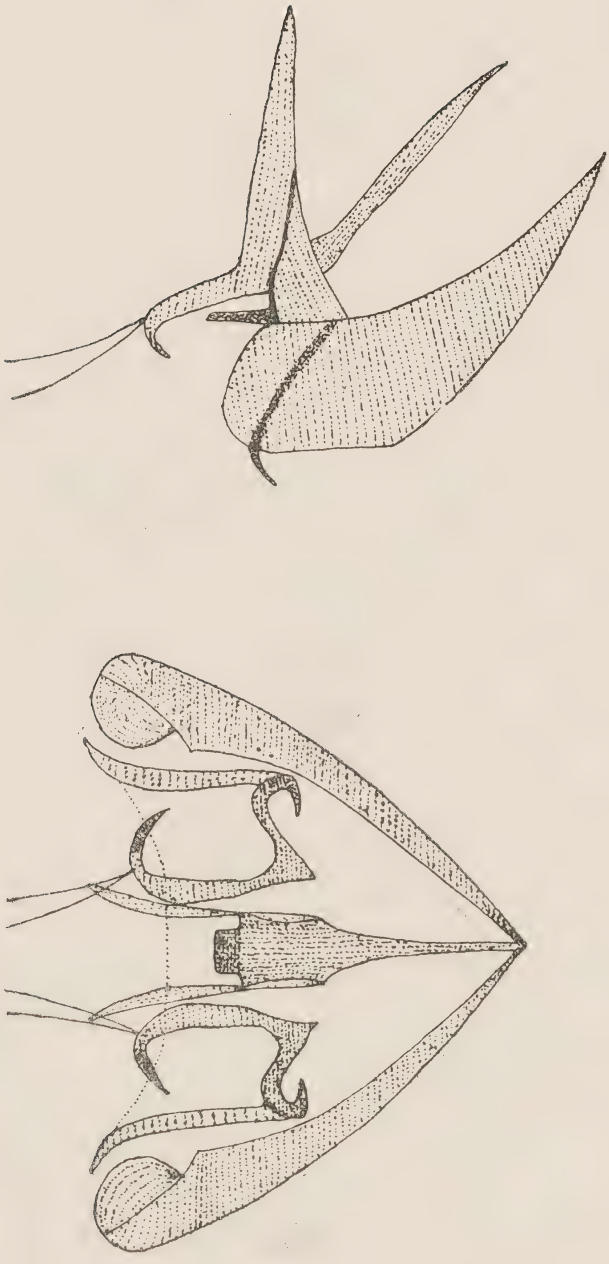


Bengalia surcoufi.

R. A. Senior-White, *del.*

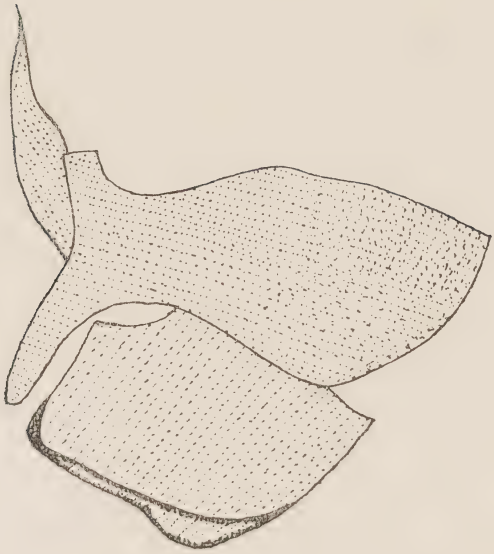
Bengalia latro.

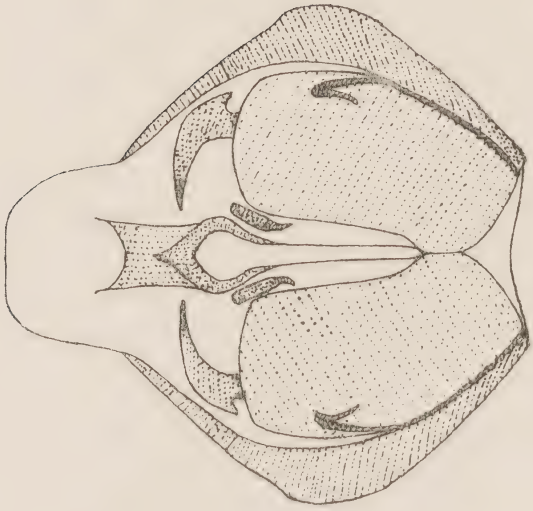
R. A. Senior-White, *del.*



Caiusa indica.

R. A. Senior-White, *del.*





Caiusa testacea.

R. A. Senior-White, *del.*

NOTES ON A FEW ABERRATIONS OF CEYLON BUTTERFLIES.

By G. M. Henry,

Assistant in Systematic Entomology, Colombo Museum.

(With two Plates.)

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1. *Cynthia asela*, ♀, *Plate I., Fig. 1.*—This specimen was purchased from a native collector during my absence on leave, and, unfortunately, no definite data as to place, date, or circumstances of the capture were ascertained from him at the time. Apparently, the importance of the specimen was not realized, as it was not set, and on my return I found it amongst a miscellaneous assemblage of butterflies put away in a drawer. The specimen has now been relaxed and set, and is in fair condition.

It may almost be described as a melanism, but in addition to being darker than the normal form, it also differs in the following points: Fore wing, upper side. The transverse discal white band is very much reduced in breadth and disappears almost entirely above vein 6. The proximal portion of the wing is darker than normal. The black, median, transverse line (or rather, series of lunules) is darker and more diffuse, and the post-discal series of black spots is very large and ill-defined. The whole space between the two subterminal zig-zag lines is filled in with brownish-black. The pre-apical white spot is somewhat irrorated with dark brown scales.

Hind wing, upper side. The white band has disappeared altogether, except in interspace 8, its place being taken by the brown ground colour irrorated with greenish-blue of a darker tint than normal. The post-discal series of ocelli is represented by diffuse white spots in interspaces 2 and 5, more or less surrounded by the dark brown of the proximal subterminal zig-zag line which is very much broader and more sharply angulated than in the normal form. The distal subterminal line is absent altogether.

Fore wing, under side. The 1st and 4th transverse cellular lines entirely absent. The ground colour between the 2nd and 3rd, instead of being darker than between the 3rd and 5th, is lighter, owing to a dark brown suffusion outside the area enclosed by the 2nd and 3rd. The dark transverse discal line is obsolete, its place being taken by a very sinuous, diffuse border to the darker basal portion of the wing. The proximal sub-terminal dark line is similarly obsolescent, while the distal subterminal line is absent.

Hind wing, under side. The upper portion of the disc is occupied by a dark brown diffuse blotch, in which a pale oval mark surrounds the middle discocellular. All the transverse lines are practically obsolete, the distal subterminal being absent, while the others are very diffuse and barely indicated. The ocelli are obsolescent, being represented only by ill-defined white spots. This specimen is numbered 4,027 in the Museum Register of Butterflies.

2. *Papilio polytes* ♀ *form polytes, Plate II., Fig. 2.*—This specimen was bred by me in Colombo, eclosion taking place on September 6, 1921. It is merely a melanism differing from normal in the following points. The discal patch of five white spots on the hind wing is much smaller than usual, the spot in interspace 2 being especially reduced in size, and being closely followed distally by a small transverse red spot. The subterminal red lunules in interspaces 3, 4, and 5 are absent, while those in 1, 2, 6, and 7 are much reduced. The terminal red lunules are obsolete, except in interspaces 1, 2, and 3, where they are very much reduced. In interspaces 4 and 5 they are just indicated. The dusting of blue scales on the hind wing is much reduced.

The under side of the hind wing is similar, but all the orange terminal and subterminal lunules are present though much reduced in size, especially in interspaces 3, 4, and 5. There is no red spot immediately below the white discal spot in interspace 2.

The whole ground colour of the insect is darker than normal. The body, head, and limbs appear to be normally marked. Colombo Museum, Registered Number 4,112.

Fig. 1.
Cynthia asela, ♀ aberration.

Fig. 2.
Terias hecabe, gynandromorph ?

E. L. Moses, *del.*

Fig. 1.
Papilio parinda, ♂ aberration.

Fig. 2.
Papilio polytes, melanism.

E. L. Moses, *del.*

3. *Papilio parinda* ♂, *Plate II., Fig. 1.*—This specimen was taken by me at Badulla on April 6, 1922. It was sucking nectar from the flowers in an overgrown Hibiscus hedge that attracted large numbers of the same species daily. Several normal specimens were taken at the same time.

The specimen is slightly deformed, having the left fore wing noticeably narrower than the right.

On the hind wing, upper side, the aberration consists wholly in the complete absence of any trace of the post-discal series of black spots. The subterminal and terminal series are perfectly normal.

On the under side the aberration is more striking. The large basal black area is reduced to a blotch in interspace 1, another in the middle of the cell, and a small smudge in interspace 7. The red space in the basal area is, however, greatly enlarged, occupying about half the normal black area. Distally it shades gradually into the ochraceous blue ground colour, which is normal in tint. The post-discal row of spots is represented by very small, ill-defined spots in interspaces 1, 2, 3, 4, and 5. Otherwise the wing is normal.

The fore wings are normal on both sides as regards colour markings, as are also the head, body, and limbs. Colombo Museum, Registered Number 4,267.

Terias hecabe, Plate I., Fig 2.—This specimen, which appears to be a gynandromorph, was taken by me on February 4, 1914, at Niroddumunai near Trincomalee, on the Batticaloa road. Its chief peculiarity lies in the fact that the wings on the right side are considerably smaller than those on the left, and are white in colour instead of yellow. The external genitalia apppear to be ♀ in type. Colombo Museum, Registered Number 3,201.

N.B.—In the figure, the difference in size between the right and left pairs of wings is not quite sufficiently indicated.

THE FLEAS OF THE GENUS XENOPSYLLA IN RELATION TO PLAGUE.

By L. F. Hirst, M.D., D.P.H.,
City Bacteriologist, Colombo.

PLAGUE first appeared in India in 1896 at Bombay, spread steadily southward over the Peninsula, and finally broke out in epidemic form at Negapatam at the end of November, 1913.

From the beginning, large tracts of country and important cities in India have remained comparatively immune from plague. Islands, as it were, left high and dry in the midst of the epidemic flood. The Cities of Madras and Colombo are in constant communication with all parts of plague-infected India. Yet Madras has only suffered from one small outbreak on the outskirts of the city (1905), which was speedily suppressed. For many years Colombo was thought to be immune from plague. The climatic conditions prevailing in both cities at certain seasons of the year are not unfavourable to plague as was pointed out by Hirst in 1913.

In Colombo both human and rat plague first appeared in Sea street near the harbour in January, 1914. The disease has now become endemic in this quarter of the town. It has been speedily stamped out elsewhere whenever it appeared.

The Plague Commissioners in spite of extended investigations were unable to explain the relative immunity of Madras City from plague. They identified the rat flea of the City as *Xenopsylla cheopis*. Hirst (November 15, 1913) addressing a meeting of the Ceylon Branch of the British Medical Association stated that the rat flea of both Colombo and Madras City was *Xenopsylla astia* exclusively. He produced evidence to show that this flea bites man with reluctance at ordinary Colombo temperature. Subsequently (1917), he reported great difficulty in transmitting plague from rat to rat by means of this new species of flea, first described by Rothschild in 1911.

Hirst found *Xenopsylla cheopis* for the first time in Colombo, shortly after the outbreak of plague, on rats caught in the vicinity of Sea street. This identification was confirmed by

Rothschild in April, 1914. *Xenopsylla cheopis* has been proved by numerous experimenters to be a plague flea and readily bites man. In 1913 Hirst suggested that the relative immunity of Ceylon and parts of Southern India from plague was to be correlated with the geographical distribution of *Xenopsylla astia*. Rothschild (1914) pointed out that the fleas of the Genus Xenopsylla occurring on rats in India were divisible into three species :—*X. cheopis*, *X. astia*, and *X. brasiliensis*. *X. brasiliensis* has not yet been found in Ceylon.

Hirst's hypothesis was investigated in India by F. W. Cragg, 1920–1921, who obtained fleas from all parts of India through the agency of the Sanitary Commissioner. Cragg reports as follows (April 20, 1921) : " The liability to severe epidemics of plague in those regions in which *cheopis* is the predominant flea, and the absence of such epidemics in regions where *astia* is predominant seem fairly clear." The new hypothesis, therefore, has received strong confirmation. Cragg points out that there is no distinct correlation between difference of climate and the distribution of these fleas.

The distribution of *X. cheopis* and *X. astia* on rats in their relation to plague within the City of Colombo has been specially investigated during 1921–1922. The results are most interesting and may be summarized as follows :—

Hot weather collection, April 1–July 31, 1921, from all parts of the town :—

X. cheopis .. Nil. | X. astia .. 551

Cool weather collection, November 24–February 14, 1921–1922 :—

	X. astia.	*X. cheopis.*	*Per Cent. cheopis.*
Plague area	791	167	17·43
Non-plague area ..	824	8	0·96
*Sea street (January) ..	169	51	23·18
*Plague house in Seabeach lane (December 14) ..	48	41	46·0

Plague Area : the endemic zone. Non-plague area : rest of Colombo where only sporadic cases occur.

* In centre of endemic zone.

In view of the fact that there is an old under-ground system of untrapped drains in the plague area which harbour *Rattus norvegicus*, one might expect to find *X. cheopis* more numerous upon this species of rat. This is not the case however.

The full details of these observations will be published later. They lend epidemiological support to the view that *X. astia* is not an efficient porter of plague from rat to rat. A small additional collection of fleas from the plague and non-plague zones is being mounted and will be sent to Rothschild for independent examination.

No attempt will be made here to explain this remarkable difference in the distribution of two species of fleas on the same species of rats within the narrow limits of the Municipality of Colombo.

My earlier experiments on the efficiency of *X. astia* as a porter of plague were handicapped by the lack of a supply of individually identified fleas. A few *X. cheopis* might possibly have been mixed with the fleas presumed to be *X. astia*. This, however, in no way detracts from the value of the negative results obtained.

The identification difficulty has been overcome by the use of two distinct methods. Female fleas were allowed to lay their eggs in test tubes. In a few days the mother flea dies of starvation. It can then be removed, mounted, and identified under the microscope. Fleas are bred out from the eggs in a mixture of bran and blood-soaked rag placed at the bottom of the test tube. Each flea can then be placed in a separate tube with a species label. The alternative method is to lightly chloroform the female flea and lay it on its left side on the stage of the microscope, powerfully illuminated from above. The flea can then be distinguished at a glance by the shape of the receptaculum seminalis.

Having obtained a collection of both *X. astia* and *X. cheopis* accurately named by these methods, I have compared the two fleas under similar conditions in two sets of experiments.

(1) Designed to test the readiness with which they bite man; using the same technique as Martin and Chick (1911). The results confirm my earlier conclusion that *X. astia* does not bite man readily.

(2) Designed to test the readiness with which they transmit plague between rat and rat and between mouse and mouse.

All attempts to carry plague between rats, mice, or guinea pigs by means of accurately identified *X. astia* have failed. Seventy-five *X. astia* were used in these experiments.

In a similar series of experiments with only twenty-three *X. cheopis*, plague was carried from mouse to mouse four times during January and February, 1922. The experimental methods were similar to those described in the Plague Commissions Reports (1906) and by Martin and Bacot (1914).

Incidentally, a novel method of transmission of plague by fleas has been experimentally tested and given positive results. Martin and Bacot have shown that mice can be infected by the single bite of a plague-carrying flea, whose gizzard is blocked by growth of plague bacilli. They explain the mode of infection by regurgitation of the blood of the host back into its tissues after contact with the plague growth in the gizzard valve of the flea. I suggest that the most frequent mode of transmission of plague by fleas in nature is the carriage of virulent bacilli in the pharyngeal pump of a blocked flea from a rat newly dead of septicæmic plague to a new host, into whose tissues this virulent blood is regurgitated in the manner aforesaid. Martin and Bacot have produced evidence to show that plague bacilli after growing in the stomach of a flea become less virulent than fresh blood strains.

If the distribution of plague is correlated with the distribution of particular fleas, then it is possible to divide Ceylon and India and their great cities into potential and non-potential plague zones by simply surveying their rat fleas, just as the tropics can be divided into malarial and sleeping-sickness belts on the basis of the distribution of particular winged insects. The energies of the Sanitary Departments concerned can then be concentrated on the danger spots, and made increasingly effective in the war against this terrible disease.

The advances recently made in our knowledge of the epidemiology of plague are the direct result of the labours of two workers, namely, the Hon. N. C. Rothschild and Dr. Karl Jordan, who for many years have devoted themselves in a purely scientific spirit to the study of zoology.

References.

(1) Hirst, L. F. .. Journal of the British Medical Association (Ceylon Branch), Vol. X., Part II., pp. 39–41, 1914.

(2) Hirst, L. F. .. British Medical Journal, 1914. Vol. I., p. 85.

(3) Philip, W. M., and Hirst, L. F. .. Journal of Hygiene, Vol. XV. p. 527, 1917.

(4) Rothschild, N. C. .. Novitates Zoologicæ, Vol. XVIII. pp. 117–122, 1911.

(5) Rothschild, N. C. .. Bulletin of Entomological Research, Vol. V., pp. 83–86, 1914.

(6) Chick, Harriette, and Martin, C. J. .. Journal of Hygiene, Vol. XI., pp. 122–136, 1911.

(7) Reports of Plague Investigations in India. Collected Volumes I. & II., Journ. of Hyg.

XLVIII. .. Plague in Madras City, Vol. XII., pp. 207–220, 1912.

LXVII. .. Observations on the mechanism of the transmission of plague by fleas. Bacot, A. W., and Martin, C. J., Vol. XIII., p. 423, 1914.

(8) Cragg, F. W. .. Indian Journal of Medical Research. Special Indian Science Congress Number, p. 29, 1920.

(9) Cragg, F. W. .. Indian Journal of Medical Research, Vol. IX., pp. 374–397.

TWO UNDESCRIBED RHOPALOCERA FROM CEYLON.

By N. D. Riley, F.E.S.

Tajuria arida sp. nov.

♂ *Upper Side—Both Wings :* A rather dull frosted grayish-blue. *Fore wing :* The blue confined to areas 1 and 1*a* from base to within 2 mm. of hind margin, a very small diffuse patch in the base of area 2 and a similar narrow area along the lower edge of cell from base to origin of vein 2 ; the remainder of the wing black and slightly glossy. Cilia shading from black at apex to almost white at anal angle. The veins running through the blue area delicately black. *Hind wing :* The blue occupies the whole wing with the exception of the costal area, the distal half of area 6 and the narrow marginal line, which are black, and the abdominal area, which is light gray, but darker distally. Veins as in fore wing. Close to the margin in area 1*c* a minute black circular spot ; in area 2 another similar, but very much larger. Cilia gray, white-tipped. Anal lobe pale bluish-gray, with a few dull orange scales against inner margin.

Under Side—Both Wings : Clear pale French gray, with a very fine black marginal line, and crossed by a fine, black post-discal line interrupted at the veins. *Fore wing :* Post-discal line runs from area 7 to vein 1 at an average distance of 3 mm. from hind margin, its sections well separated. Midway between it and hind margin a series of very indefinite, cloudy darker, crescentic markings. Cilia darker than ground colour of wings. *Hind wing :* Post-discal line more prominent than on fore wing, from vein 8 to vein 1*a* just short of its termination, deeply angulate in area 1*c*, sub-marginal markings rather more prominent, duplicated, with a paler area between each pair, the black spot in area 2 as above, but surmounted by a much larger, crescentic, proximally black-edged deep

orange-red mark, some gray scaling in area 1c close to post-discal line, anal lobe black crowned with pale blue outwardly, orange-red inwardly.

♀ *Upper Side.—Both Wings:* Similar to the ♂, but the blues are replaced by silvery-gray, with only a faint bluish tinge. *Fore wing:* The pale area more extensive than in the male, reaching from inner margin to vein 4, filling the bulk of the proximal half of area 3 and the lower part of cell, in which its upper edge extends in a curve from origin of vein 3 to base; much paler about the base of area 2, almost whitish, its outer edge not approaching hind margin as closely as in the male. *Hind wing:* The black spots in areas 1c and 2 subequal, the post-discal marking of under side represented by broader smudgy lines, otherwise as in the male.

Under Side.—Ground colour very faintly tinged with ochreous; otherwise exactly like the male.

In both sexes the colouration of the thorax and abdomen, above and below, and of the *legs*, agrees with that of the adjacent wing surfaces.

Head black, with a white ring round the eyes, round the base of the antennæ, and a white spot on vertex. *Palpi* white, except for such portions as are visible from above—third and distal half of second joint—which are black.

Antennæ black, the proximal half inconspicuously white ringed, the extreme tip only orange.

Length of fore wing, ♂ 16·5, ♀ 17 mm.

Described from 1 ♂ and 1 ♀ collected by Mr. W. Ormiston at Haldummulla, Ceylon, 3,000 feet, in September, 1918, now in the British Museum Type No. 210 ♂; 211 ♀. There are in addition one ♂ and two ♀ in Mr. Ormiston's collection, all five specimens have been taken at the same time at *Poinsettia* bloom, after a long drought, and in company with *T. cippus*.

These specimens were at first thought to be *T. jehana jehana* as it was obvious they were not *T. jehana ceylanica* from which the darker colouration of the upper side alone at once separates them. *T. jehana* in the male is of a much paler and brighter

blue, the hind margin of the fore wing is slightly excavate posteriorly (decidedly convex in *T. arida*), the club of the antennæ is pale brown, usually with a white streak, and those under side markings, which in *arida* are a deep orange-red, are of a very pale watery ochreous colour in *jehana*.

AMBLYPODIA ABSEUS MACKWOODI, ssp. nov.

A. abseus lanka Evans MS.

♂ ♀.—*Upper Side.*—Colouration as in North Indian (Sikkimese) *abseus*, but with the black borders of both wings reduced to about half the width, *i.e.*, on fore wing about 2 mm. wide at tornus to 5 at apex; hind wing 2–3 mm. in ♂, proportionately in ♀.

Under Side.—The apex of fore wing and the basal and marginal areas of hind wing shiny gray, the bands and spots outlined with paler gray; the spot in area 4 of fore wing not projecting prominently beyond the others in the band.

Described from a pair obtained at Ratnapura, Ceylon, in May, 1915, by Mr. W. Ormiston. Two other males are in the British Museum from the same locality. I have adopted for this form, in preference to Col. Evans' MS name *lanka*, a name suggested by Mr. Ormiston. Mr. Mackwood, who has been intimately associated with the Entomology of Ceylon for upwards of fifty years, was, I believe, the first to obtain this form in the Island.

A. abseus was described by Hewitson (Cat. Lyc., B. M., p. 9, 1862) as coming from Sylhet and Singapore. The description is based on a female, and contains the passage, referring to the under side: "posterior wing lilac in the middle." The specimen figured is in the British Museum, and is a female from Singapore; it is also, of all Hewitson's specimens, the one which agrees best with his description both as to the colouration of the under side of the hind wing and as to the projecting spot in area 4 on the under side of the fore wing. It also bears the label, in Hewitson's own handwriting, which he usually attached only to the specimen he described and, as a rule, figured. In fact, it was his type. It, therefore, unfortunately becomes necessary to accept the narrow-bordered

form which occurs in South Burma and Malacca, and is probably the same as Felder's *amphea* from the Philippines, &c., as typical *abseus*, renaming the North Indian, broad-bordered form *A. abseus indicus* n.n. This arrangement will give us in India, Burma, and Ceylon—

(1) *A. abseus indicus*.—Sikkim and Darjeeling and throughout Burma to Tenasserim ; Siam and Annam.

(2) *A. abseus mackwoodi*.—Confined to Ceylon and much more closely resembling the next subspecies than *A. a. indicus*.

(3) *A. abseus abseus*.—Burma (Pegu, &c.) to Malacca—at least.

The overlapping of *indicus* and true *abseus* in parts of Burma is curious and seems to indicate that we may really be dealing with two distinct species in that area. For several of the details mentioned above I am indebted to MS. notes sent me some while ago by Col. Evans.

NOTES.

Note on the distribution of the Snake Aspidura trachyprocta.—In my book on "The Snakes of Ceylon" (page 213), I included the Uva patnas (Lennock estate), within the habitat of *Aspidura trachyprocta*. Mr. Drummond-Hay has written to me that this is a mistake. He has never found this species on the Uva patnas, nor anywhere, except at about the elevation of Warwick Estate, Ambawela (5,000 to 6,000 feet).

Karachi, March 5, 1922. F. WALL.

Notes on Birds of Colombo.—The useful list of Birds of Colombo published by Mr. W. A. Cave in "Spolia Zeylanica," Vol. VIII., page 94, may be augmented by the following species, all of which have been observed by me within Municipal limits :—

Blyth's Reed Warbler (*Acrocephalus dumetorum*).—I have frequently observed this bird during the north-east monsoon, hopping about the trees and shrubs in the Museum compound. As it allowed one to approach quite close I have no doubt of its identity. In spite of its dull colouration, there is no more graceful or charming little bird as it flits actively about in a ceaseless search for insects—every now and then giving vent to a sharp little "chack."

The Red Woodpecker (*Brachyternus erythronotus*).—This bird is often to be seen in Colombo, flying from one coconut palm to another, and frequently letting off its rattling call, which, incidentally, is very similar to that of the White-breasted King Fisher but slightly higher pitched.

The Common Coucal (*Centropus rufipennis*).—This bird appears to have found its way into Colombo of recent years, as it is now frequently to be seen in Victoria park and the Museum compound, whereas, prior to 1919, I do not recollect seeing it in Colombo.

The Kestrel (*Tinnunculus alaudarius*).—Kestrels are quite common in Colombo during some winters, but other years they appear to be absent. Thus, in January-April, 1921, I could be practically certain of seeing three or four of these birds any day. They take up a regular beat and have one or two favourite perches on which they may usually be found during the heat of the day. One bird frequented the Galle Face, perching either on Christ Church tower or on a cornice of the Galle Face Hotel. A pair occupied Victoria park and perched on the Casuarinas along Green Path. Another bird used the flagstaff of the Sailing Club as its perch and hunted over the open patches of ground among the coal heaps along the harbour-front.

This year (1922), however, I have seen only one Kestrel—hawking over the Royal College grounds.

The Indian Goshawk (*Astur badius*).—It is strange that this bird should have been missed by Mr. Cave, as it is by no means uncommon in Colombo, and a pair breed regularly in Victoria park. I am inclined to think that the record of *Accipiter virgatus* is a mistake for *Astur badius*, as the former is a forest species not at all likely to be found in Colombo.

The Sea-eagle (*Haliætus leucogaster*).—I have twice observed this fine bird in Colombo. The first occasion was some years ago when I saw one flying along the shore near Galle Face Hotel. Then, on March 23 of this year, I observed another soaring above Union place.

The Lesser Sand Plover (*Ægialitis mongolica*).—In September, 1919, a small flock of these birds haunted the Galle Face for a few days. They made their appearance during a period of heavy rain. Legge records this bird as sometimes appearing on the Galle Face.

The Panayan Tern (*Sterna anæstheta*).—This Tern is not uncommon on the coast of Colombo during the rough weather which ushers in the north-east monsoon. I have seen them

attempting to alight for roosting on the roof of Kollupitiya station. That this bird is but little acquainted with man and his ways is evident from the ease with which it may be caught when it chooses the spars of a ship as a roosting-place. A specimen which I dissected some years ago on the Pearl Banks contained in its crop, amongst other things, a green Pentatomid bug (probably *Nezara viridula*) which it had probably found drifting in the sea. Verily, there is no accounting for tastes !

The Brown Gannet or Booby (*Sula leucogaster*).—Some years ago I observed a Gannet, presumably of this species, flying along the Galle Face. It made repeated attempts to perch on the coconut palm fronds near the Galle Face Hotel.

G. M. HENRY.

REVIEW.

THE SNAKES OF CEYLON.

By Colonel F. Wall, C.M.G., I.M.S.

Newcomers to Ceylon are usually obsessed with the idea that the Island teems with poisonous snakes, and that by unremitting vigilance alone can they be avoided. Although this notion is soon dissipated, every snake is still a venomous reptile, and, as such, to be destroyed at sight. Astonishing ignorance of the nature and habits of these animals prevails in the general community, an ignorance that is well evidenced in the marvellous snake stories that are accepted both in general conversation and in the non-scientific journals. But ignorance may have serious results. Many a native has died, after the bite of a harmless snake, through sheer fright and the conviction that he was a doomed man. Some of the older residents of Ceylon must know the story of the misguided planter who, when bitten on a finger by a " Green Tic," seized a chopper, laid the wounded member on the nearest tree stump, and amputated it with a single blow. It was a plucky act, but an unnecessary mutilation. A better knowledge of Ophiology would have told him that the " Green Tic " (*Trimeresurus trigonocephalus*), though of the most evil appearance, is one of the least venomous of poisonous snakes, and that the consequences of its bite are comparatively trivial.

If the work under review is as widely read as it deserves to be, there should be no further excuse for this prevalent ignorance. The descriptions and most excellent figures are so admirably clear that the identification of any snake becomes child's play. Colonel Wall has the happy gift of lucid exposition and makes even his technical descriptions interesting, while his very full notices of the habits of each species will appeal to every nature lover. He has spared no trouble

to gather all the scattered information that has appeared from time to time in various publications, and has enriched the whole with the product of his unrivalled knowledge of Oriental snakes.

As an instance of the wealth of detail provided, it may be mentioned that the particulars relating to the Python occupy twenty-three pages and that thirty-seven pages are devoted to the Cobra. But all this matter is so well arranged under sub-headings (" General Characters," " Identification," " Colouration," " Habits," &c.), that the reader can find without difficulty any section that he may require.

This book should be in the hands of every Medical Officer, for the sake of the valuable sections on the toxicology of our poisonous snakes. The symptoms and treatment, which vary for the poison of different kinds of snakes, are particularized for each species, and illustrative cases of poisoning are recorded, with clinical notes of each.

A timid person may be relieved to learn that, apart from the marine snakes, with which the ordinary resident is unlikely to come in contact, of the sixty-three terrestrial species described in this work, nine only are venomous. He may also console himself with the knowledge that fatalities from snake bite amongst Europeans are practically unknown. The reviewer can remember but one such case during a residence in the Island of thirty-two years. The European is greatly protected by his clothing. A snake, fortunately, cannot discriminate between the actual body and the garment that covers it. Casualties amongst natives are much larger, as might be expected from their habit of going bare-footed; but it is doubtful if many of the deaths attributed to this cause have been correctly diagnosed.

The author remarks upon the natural timidity of these snakes in confinement, and of their reluctance to bite. It may be observed, however, that the experiments quoted have been conducted during daylight, when a snake is at a disadvantage and appears to realize the fact. They are mostly nocturnal animals, and it is conceivable that they would be more alert and ready to resent interference at night.

Colonel Wall in his Preface anticipates that many new species of snakes remain to be discovered in Ceylon, more particularly on the mountain peaks and ranges, and he appeals for further information and observations. This Monograph (for such it is) should certainly encourage fresh workers in this neglected field.

The addition of very complete and comprehensive indices, and a useful map of the Island showing all the specified localities concludes the work.

I have noticed but a single clerical error, on page 57, where the Spotted Deer, or "Chital" (*Cervus axis*), is referred to as a "Cheetah."

The authorities of the Colombo Museum are to be complimented upon having been the means of presenting such a useful book to the public.

E. E. G.

PROCEEDINGS OF THE CEYLON NATURAL HISTORY SOCIETY.

Thirty-seventh General Meeting.

THE Thirty-seventh General Meeting of the Society was held in the Colombo Museum Reading Room on Monday, July 11, 1921, at 5.15 P.M. The Hon. Sir Graeme Thomson, K.C.B., in the Chair.

A paper entitled "Biting Flies" was read by Mr. R. Senior-White. Mr. G. M. Henry exhibited a beautiful collection of drawings of Ceylon Birds.

Thirty-eighth General Meeting.

The Thirty-eighth General Meeting of the Society was held in the Colombo Museum Reading Room on Thursday, September 1, 1921, at 5.45 P.M. Dr. Joseph Pearson in the Chair.

New Members:—Colonel Boylan Smith, D.S.O., Mrs. Sinclair, and Miss A. Sinclair.

A paper entitled "Flower Fly Traps" was read by Mr. T, Petch. Mr. G. M. Henry exhibited specimens of Caddis fly larval tubes.

Thirty-ninth General Meeting.

The Thirty-ninth General Meeting was held in the Colombo Museum Reading Room on Tuesday, November 29, 1921, at 9.30 P.M. Dr. Joseph Pearson in the Chair.

A paper entitled "Jungle Byeways" was read by Dr. R. L. Spittel.

Tenth Annual General Meeting.

The Tenth Annual General Meeting was held in the Colombo Museum Reading Room on Monday, February 20, 1922, at 5.30 P.M. Dr. Joseph Pearson in the Chair.

The accounts and report of the Honorary Secretary and Treasurer for 1921 were read and confirmed.

The following office-bearers were elected for the ensuing year:-

Patron : His Excellency the Governor.

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Honorary Secretary and Treasurer.—Mr. A. H. Malpas.

New Members :—Messrs. H. R. Freeman, J. A. Henderson, G. Balasuriya, Dr. Flamer Caldera, Messrs. C. Amirthalingam, R. H. S. Schrader, E. Burgess, and H. F. Carter.

Honorary Members :—Col. Frank Wall, C.M.G., I.M.S., and Mr. E. Steuart Baker, President, Ornithologist's Union.

A Paper entitled " Man and the Balance of Nature " was read by Dr. L. Nicholls.

Forty-first General Meeting.

The Forty-first General Meeting was held in the Colombo Museum Reading Room on Wednesday, June 21, 1922, at 6.15 P.M. Dr. A. Nell in the Chair.

A paper entitled " Facts and Fables regarding some Ceylon Birds and Beasts " was read by Dr. R. L. Spittel.

Mr. G. M. Henry gave an exhibition of some aberrations of Common Butterflies.

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EDITED BY

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1924.

EDITORIAL NOTICE.

The present part completes the twelfth volume of *Spolia Zeylanica* and also marks the termination of the present series which first appeared in 1903. In future *Spolia Zeylanica* will form the Zoological and Geological Section of *The Ceylon Journal of Science* which has been founded by the Ceylon Government for the publication of Scientific papers connected with Ceylon. The Journal will be divided into separate sections, and each section will be virtually a separate publication, having its own Editors and dealing with its own subject. Only for purposes of general administration will the various sections be controlled by the Board of Management. It is hoped that under the new administration the Zoological and Geological Section will appear at more frequent intervals than was possible under the old conditions, and it is particularly requested that exchanges which hitherto have been sent to the Editor of *Spolia Zeylanica* at the Colombo Museum should still be sent to that institution.

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A CATALOGUE OF THE DRAGONFLIES (ODONATA) RECORDED FROM CEYLON, BASED ON MATERIAL COLLECTED BY Mr. E. E. GREEN, WITH DESCRIPTION OF A NEW SPECIES.

By F. F. Laidlaw, M.A.,

Corresponding Member, Malayan Branch, Royal Asiatic Society.

IT is close on thirty years since Kirby published his list of the "Dragonflies of Ceylon." That fact and the opportunity of examining an extensive collection, kindly offered to me by Mr. E. E. Green, are my excuses for publishing the present list. It is evident that I have to record nothing very striking in the way of novelties, but I cannot believe that our knowledge of the fauna of this great Island is as yet at all complete. So far as our knowledge goes, the list is more remarkable perhaps for its negative characters than for the number of species which must be noted as endemic to Ceylon.

Thus for the *Aeschninae* we have to note the absence, not only of any member of the *Brachytron* series, but also of *Heliaeschna;* and the relatively poor development of *Gynacantha*—genera one would expect to find well represented. Leaving aside the *Gomphidae* as still too imperfectly known to admit of comment, I may notice in passing that the *Chlorogomphinae* are also missing. In the case of the *Libellulidae* no record can be made of *Macromia* or of *Idionyx* amongst the *Corduliinae,* whilst the *Libellulinae* have no representative of *Lyriothemis,* otherwise a typical Oriental genus ; and in general, with only two or three exceptions, the sub-family is represented by a considerable number of common widely ranging species. When we turn to the sub-order *Zygoptera* we find that the *Calopteryginae* and *Epallaginae* so richly represented in North-east India have but few representatives, *Rhinocypha* is absent, but is found everywhere else in suitable areas throughout the region ; the sub-family *Megapodagrioninae* is absent and the *Platycnemis* series of the *Platycneminae* (*Coeliccia,* &c.) is only represented by the almost ubiquitous *Copera marginipes.*

Some, but by no means all, of these negative features Ceylon shares with the Nilgiri Hills, the latter however have *Orogomphus* amongst the *Chlorogomphinae* and *Idionyx* for the *Corduliinae* as well as two *Rhinocyphas*. Their fauna too has special characters of its own, which differentiate it from that of Ceylon as well as from other parts of the Orient.

Positive features of the Ceylon dragonfly fauna are briefly summed up as follows. :—

Firstly, the existence of a number of peculiar species of the *Platystictinae*, a very remarkable and probably very ancient group of *Zygoptera*. Secondly, the possession of several endemic species of *Disparoneura*. Thirdly, a localized development of *Lestes;* and, fourthly, the possession of a certain, rather small, number of species apparently confined to the Island, but belonging to genera well represented elsewhere in the region ; the most noteworthy of these is perhaps *Pseudophaea splendens*.

Lastly, we may note the occurrence of a few species which seem to point to a relationship with Malaya, *e.g.*, *Micromerus* spp., *Cratilla lineata*, *Indothemis limbata*, and again *Pseudophaea splendens*.

These characters, both positive and negative, be it clearly understood, are liable to modification as the result of future discoveries.

A remark is necessary on the classification adopted, as this departs somewhat from that usually employed.

I have erected a family *Gomphidae* for those genera usually placed in the *Aeschnidae* in the sub-family *Gomphinae*, because I feel that the sub-ordinate position usually given to them in the *Aeschnidae* is largely a matter of traditional usage, and that their structure both in larval and adult stages is so distinct from the *Aeschninae*, that they are fully entitled to stand apart from the latter.

I use the expedient of brigading the *Zygoptera* into a number of sub-families. I cannot bracket any of these under family headings, and though some of the sub-families may ultimately come to rank as families, I do not think it advisable to give them that rank at present or until more is known of the

phylogeny of the order. The sub-families named agree substantially with those recently suggested by Kennedy and are in accordance with venational characters of the adult, and so far as is known with larval structure as well.

References to Literature.—I have given as few as possible. For the *Libellulinae* the great monograph of Dr. Ris is a sufficient reference except in a very few cases. For other groups Kirby's catalogue is often sufficient, any other that may be required I have, I think, given under the heading of the species.

Kirby's paper "Catalogue of the described *Neuroptera Odonata* (Dragonflies) of Ceylon with Description of New Species," Journ., Linn. Soc. London. Zool., XXIV., pp. 545–566, Pl. 41–42, 1893, is the work on which the present account is based, and has been freely consulted in connection with it. For convenience this is referred to as Kirby. "Dragonflies of Ceylon."

Species not recorded in Kirby's list are marked in this paper with an asterisk (*). Those not included in Mr. Green's collection are indicated by a cross (†).

SUB-ORDER : Anisoptera.

FAMILY : Aeschnidae.

Aeschninae.

For this sub-family, in addition to Kirby's paper already quoted, the following papers may be consulted :—

1909–1913 .. Martin, R.—"Collections Zoologiques duc Baron Edm. de Selys Longchamps," fasc. 18–20, Aeschnines.

1921 .. Laidlaw, F. F.—"A list of the Dragonflies recorded from the Indian Empire," Pt. IV., Records of the Indian Museum, XXII., Pt. II., pp. 75–91.

1921 .. Fraser, E. C., Major —"Indian Dragonflies," Pt. XI., Journ. Bombay Nat. Hist. Soc., 1921, pp. 107–122.

1.—* Anax immaculifrons (Ramb.).

A. immaculifrons Kirby, Cat. Odonata, p. 84; Fraser, *op. cit.*

1 ♂ Hakgala, August, 1911. 1 ♀ Kandy, September.

Not recorded hitherto for Ceylon. Ranges over Peninsular India, whilst a geographical race has been recorded by Dr. Ris from Hong Kong. Apparently does not occur in Malaya.

2.—Anax guttatus (Burm.).

A. guttatus Kirby, Cat. Odonata, p. 84; Laidlaw, *op. cit.*; Fraser, *op. cit.*

1 ♂ Kandy, May 12, 1910, 1 ♂ Dambulla, June, 1911, 2 ♂♂ Peradeniya, December 5, 1912 (caught at light).

1 ♀ Galagedara, January, 1910, 1 ♀ Kandy, December, 1910

The species has a wide range, from the Seychelles Islands to the Pacific.

3.—† Anax (Hemianax) ephippiger (Burm.).

Hemianax ephippiger Kirby, Cat. Odonata, p. 85; Fraser, *op. cit.*

I have not seen examples from Ceylon. Very common in India, ranging to the Mediterranean.

4.—Gynacantha hyalina (Selys.).

Acanthagyna subinterrupta Kirby, "Dragonflies of Ceylon," p. 558. Text. fig. 40; *Gynacantha hyalina*, Ris., Suppl. Entomol. No. 5, 1916, pp. 59–60; *Acanthagyna hyalina*, Kirby Cat. Odonata, p. 95.

1 ♀ Chilaw, January, 1910.

This is the only species that I know as certainly found in Ceylon, assuming, of course, that my identification is correct. The species is closely related to *sub-interruptor* (Ramb.), but the latter is, I believe, a more easterly ranging form found from Java to Papua, whilst *hyalina* occupies a wide area embracing India, Indo-China, and the Philippine Islands.

Gynacantha furcata Ramb. I have not seen.

FAMILY : Gomphidae.

Sub-family : **Gomphinae.**

Apart from the references given in Kirby's catalogue there is no account as yet published dealing with the Indian species of the sub-family. I have an account of them now in the press awaiting publication in the " Records of the Indian Museum."

Species from Indo-China are dealt with by Dr. Ris in two important papers.

1912 " Neue Libellen von Formosa, Südchina, Tonkin und den Phillippinen." Supplementa Entomologica No. 1., Berlin.

1916 " Odonata—H. Sauter's Formosa-ausbeute." Supplementa Entomologica, No. 5, Berlin.

5.—Ictinus rapax (Ramb.).

Ictinus rapax Kirby, Cat. Odonata, p. 77 ; Kirby, " Dragonflies of Ceylon," p. 558.

2 ♂♂ Kandy, May.

These specimens resemble examples from the south of the Peninsula in having the pale markings on the metepisternite nearly obsolete, leaving the side of the thorax with only two widely separated pale bands.

6.—† Heliogomphus nietneri (Selys.).

Anisogomphus nietneri Kirby, Cat. Odonata, p. 69 ; *id.* " Dragonflies of Ceylon," p. 557.

I have not seen specimens from Ceylon. The species occurs also in Assam ; I have examined a pair from the Garo Hills. Other species of the genus are recorded from Tonkin and S. China and from the Malay Peninsula.

For the genus *Heliogomphus* I must refer to the paper as yet unpublished in the Records of the Indian Museum.

7.—* Macrogomphus annulatus Selys. ?

Macrogomphus annulatus Kirby, Cat. Odonata, p. 63

Fraser, Rec., Indian Museum, XVI., Pt. VII., pp. 461–462.

2 ♀♀ Haragama, August, 1903, July 18, 1910

An addition to the fauna. These specimens show some differences from examples in my collection from Poona.

The black on the upper lip is much more extensive in the specimens from Ceylon, the post-clypeus is almost entirely black with two very small yellow spots. There is no yellow spot on the occiput. The yellow stripe on either side of the mid-dorsal carina of the synthorax is narrower and does not reach to the level of the ante-alar sinus, and the small superior spot just inside the humeral suture found in the specimens from Poona is obsolete.

8.—* Mesogomphus lineatus. (Text Fig. 1.)

Lindenia lineata Kirby, Cat. Odonata, p. 59.

1 ♂ Kandy, July 11, 1910. 1 ♀ Peradeniya, April 27, 1911.

This species like *capricornis* Forster of the Malay Peninsula, is undoubtedly congeneric with the African species referred by Ris to *Mesogomphus*. The genus is not very sharply separated from *Onychogomphus*, but the secondary male characters indicate that it is a natural little group.

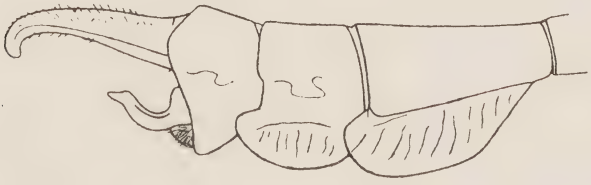

Fig. 1.—Terminal segments of abdomen of *Mesogomphus lineatus*.

Lineatus has a wide range in India and seems to be a common species. The Ceylon specimens show certain colour

peculiarities which may be sufficient to define a geographical race. These characters are as follows :—

(i.) A well marked black band along the top of the vertical part of the frons with clearly defined T-shaped mark on the horizontal part.

(ii.) A black band along the suture between the ante- and post-clypeus.

(iii.) Space between posterior ocelli dark brown.

(iv.) Yellow line on dorsum of synthorax immediately dorsal to humeral suture interrupted, having only an upper and lower vestige.

(v.) Lateral black band of synthorax marked with vestiges of yellow spots only, instead of being almost completely interrupted by a yellow line.

For the characters of *Mesogomphus* see Ris. "The Odonata or Dragonflies of South Africa." Annals of the South African Museum, XVIII., part III., pp. 343 and 29.

In my paper on Gomphines above alluded to I have included this species in the genus *Onychogomphus ;* it is better referred here.

9.—*Cyclogomphus heterostylus Selys. (Text Fig. 2.)

Cyclogomphus heterostylus Kirby, Cat. Odonata, p. 69.

1 ♀ Kandy, May 1911.

I have compared this specimen with a female from Poona, received from Major Fraser, and can find no difference.

Fig. 2.—Lateral view of the genital structures of the second abdominal segment of *Cyclogomphus heterostylus* ♂ (specimen from Poona).

10.—*† Heterogomphus sp.

A fine male in the British Museum collection taken by Col. Yerbury is the type of this species, the description of which will be published in my paper on Indian Gomphines already referred to. The specimen was apparently overlooked by Kirby as it was mounted along with examples of *Ictinus rapax*, to which species it bears some resemblance. It is quite distinct both from the Himalayan and from Malayan species. Major Fraser tells me (*in litt.*) that he has taken a *Heterogomphus* in the Nilgiri Hills; this may be identical with the Ceylon form.

11.—† Gomphus? ceylanicus Selys.

Aeshna (*?*) *ceylanica* Kirby, Cat. Odonata, p. 68.

The species is known only from the type which I have not been able to examine. The position is doubtful.

FAMILY : Libellulidae.

Sub-family : **Corduliinae.**

For this sub-family reference may be made to Martin's Monograph in the "Collection Zoologiques du Baron Edm. de Selys-Longchamps" Fasc. XVII.," Bruxelles, 1906, and to Fraser's account of "Indian Dragon Flies," Pt. X., in the Journal, Bombay Nat. Hist. Society, 1921, pp. 673–692.

12.—Azuma cyanocephala (Hagen).

Epophthalmia cyanocephala Kirby, Cat. Odonata, p. 54,
Id. "Dragonflies of Ceylon," p. 557.

1 ♂ ad, May. 2 ♀♀ teneral. Kandy, September, 1911.

Closely allied to *E. vittata* (Burm.) from the mainland this species is, I think, sufficiently distinct to deserve a specific name. It is one of the largest and handsomest of the Libellulidæ.

♂ Abd. 50 + 2·5 mm., N. W. 47·5 mm.

♀ Abd. 53 mm., N. W., 50 mm.

The female specimens are both teneral, their colouring seems to differ, but little from that of the male. The wings, however, are marked with a smoky-brown in the costal and

sub-costal spaces as far as the arculus, and in addition have a golden-yellow tinge from about half-way between the nodus and pterostigma to the apex.

Sub-family : **Libellulinae.**

The only reference needed for this sub-family is to Ris's Monograph of the Libellulinae in the "Collections Zoologiques du Baron. Edm. de Selys Longchamps," fasc. 9–16, 1909–1920.

Where Ris's nomenclature differs from Kirby's I have added the specific name given by the latter in the "Dragonflies of Ceylon."

13.—Tetrathemis yerburyi Kirby.

Tetrathemis yerburii Kirby, "Dragonflies of Ceylon," p. 556, Pl. XLI., Fig. 4.

1 ♀ Hatton, May, 1911.

A species recorded only from Ceylon. The genus ranges from tropical Africa to North Australia.

14.—† Hylaeothemis fruhstorferi (Karsch).

Tetrathemis fruhstorferi Kirby, "Dragonflies of Ceylon," p. 556.

Originally described from Ceylon, this species has lately been found by Major Fraser in the Nilgiri Hills.

(See Fraser Journ., Bombay, Nat. Hist. Soc., January, 1915, pp. 354–355.

15.—* Cratilla lineata (Brauer).

1 ♂, 1 ♀, Kandy, May 10, 1911.

I cannot separate these specimens from examples from Borneo by any features of specific or even of sub-specific value.

They are presumably identical with Forster's species *Cratilla calverti* from Malabar ; and, if so, that species cannot stand.

Cratilla appears to be an example of a genus occurring in S. India, Ceylon, Burma, and the Malayan countries, but absent from the Himalayas.

16.—† Lathrecista asiatica (Fabr.).

Lathrecista simulans Kirby, "Dragonflies of Ceylon," p. 553.

The species ranges over the whole Oriental region and as far as the Tonga Islands in the Pacific.

17.—Potamarcha obscura (Ramb.).

2 ♂♂ Chilaw, January, 1910. 1 ♂ Galagedara, January, 1910.

1 ♂ Puttalam, January, 1910.

2 ♀♀ Chilaw, January, 1910. 1 ♀ Batticaloa, August, 1910.

The single species of the genus ranges over nearly the whole Oriental region. The specimens before me have well-marked yellow tinting along the costal margin of the wings much more pronounced than in examples from Lower Siam.

18.—Orthetrum pruinosum neglectum (Ramb.).

Orthetrum pruinosum Kirby, "Dragonflies of Ceylon," p. 554.

3 ♂♂ Kandy, May, 7, 1911. 1 ♂ Kandy, July, 1910.

2 ♀♀ Kandy, May 12, 1911.

The species ranges to Java and Borneo, the sub-species is Indian.

19.—Orthetrum luzonicum (Brauer).

Orthetrum tricolor Kirby, "Dragonflies of Ceylon," p. 555–556.

2 ♂♂ Maskeliya, 4–5,000 ft., May 4, 1901 "abdomen and eyes pale blue." (Very mature and pruinose.)

3 ♂♂ Pundaluoya, November, 1909. 1 ♂ Kandy, November, 1909.

Ranges through India and Burma to Sumatra and Java.

20.—Orthetrum sabina (Drury).

1 ♂ Peradeniya, May, 1902. 1 ♂ Trincomalee, August, 1909. 1 ♂ Kandy, November, 1909.

2 ♂♂ Chilaw, January, 1910.

1 ♀ Trincomalee, November 2, 1901. 1 ♀ Trincomalee, September, 1909, 2 ♀♀ Peradeniya, November 10, 1909, 1 ♀ Chilaw, January, 1910, 1 ♀ Kandy, May 11, 1911.

Ranges over the whole Orient to the Pacific and Australia. One of the commonest dragonflies in collections from all parts of the East.

21.—Orthetrum glaucum (Brauer). (Text Fig. 3.)

4 ♂♂ Pundaluoya, November, 1909. 1 ♂ Kandy, May, 1911. 1 ♀ Maskeliya, 4,500 ft., April, 1901. 3 ♀♀ Pundaluoya, November, 1909.

Ranges from India and Ceylon to Hong Kong and the Celebes.

Fig. 3.—Lateral view of genital structures of the second abdominal segment of *Orthetrum glaucum* ♂.

22.—† Orthetrum triangulare (Selys.).

Orthetrum carnaticum Kirby, "Dragonflies of Ceylon," p. 555.

Ranges through India and Burma to Malacca. Major Fraser tells me (*in litt.*) that he thinks there is some possibility that the species *triangulare* may really include two distinct forms which have been confused.

23.—† Brachydiplax sobrina (Ramb.).

Occurs in Ceylon, India, and Burma. It is the only representative so far as I know in Ceylon of the group to which it belongs—a group which is very characteristic of the Great Sunda Islands, especially of Borneo and the Malay Peninsula.

24.—Diplacodes trivialis (Ramb.).

Trithemis trivialis Kirby, "Dragonflies of Ceylon," p. 550.

1 ♂ Trincomalee, December 9, 1900. 1 ♂ Peradeniya, May, 1902. 1 ♂ Sigiriya, September 5, 1909. 1 ♂ Kandy, November 26, 1909. 1 ♂ Batticaloa, August, 1911. 1 ♂ Jaffna, September, 1911. 2 ♀♀ Sigiriya, September 6, 1909. 1 ♀ Galagedera, January, 10. 1 ♀ Chilaw, January, 1910. 1 ♀ Batticaloa, August, 1911.

Ranges from the Seychelles through the Orient to New Guinea. Often taken at sea.

25.—Diplacodes nebulosa (Fabr.).

1 ♂ Kandy, July, 1909. 1 ♂ Ambalangoda, February 28, 1911. 1 ♀ Ambalangoda, February 28, 1911.

Ranges from India and Ceylon to North Queensland.

26.—Acisoma panorpoides (Ramb.).

1 ♀ Maskeliya, April 4, 1901, 4,500 feet.

A small individual, length of abdomen 15 mm., of hinder-wing 18 mm. The sub-species ranges over India, Burma, Indo-China, and Siam, reaching Singapore and Sumatra. It has been recorded also from the Celebes, but not from Borneo. An allied species or sub-species is found in Africa.

27.—* Indothemis caesia (Ramb.).

5 ♂♂ Jaffna, June, 1910. 1 ♂ Trincomalee, April 28, 1911.

This species seems to be characteristic of Peninsular India and Ceylon, where it seems tolerably abundant.

28.—*† Indothemis limbata (Selys.), race ?

A small series of a form of this species is in the British Museum. Mr. Campion regards them as sufficiently distinct from the typical race found in the Malay Peninsula to deserve recognition as a sub-species, an opinion with which I am in agreement.

Limbata has not been recorded from the mainland of India, and is hitherto known only from lower Burma, Siam, and the Malay Peninsula.

29.—Crocothemis servilia (Drury).

Crocothemis soror Kirby, " Dragonflies of Ceylon," p. 551.

1 ♂ Kandy, July, 1909. 4 ♂♂ Chilaw, January, 1910.

4 ♀♀ Trincomalee, September, 1909. 1 ♀ Chilaw, January, 1910. 1 ♀ Jaffna, September, 1911.

♂ Length of abdomen 24 mm., of hinder-wing 27·5 mm.

♀ Length of abdomen 22 mm., of hinder-wing 27·5 mm.

30.—Bradinopyga geminata (Ramb.).

Bradinopyga stigmata Kirby, "Dragonflies of Ceylon," pp. 553–554., Pl. XLI., Fig. 3.

2 ♂♂ Jaffna, June, 1910. 4 ♀♀ Jaffna, June, 1910.
7 ♀♀ Batticaloa, September, 1911.

The males are both fully mature, the females from Jaffna are all of them teneral, those from Batticaloa are mature. The species appears especially characteristic of Peninsular India and Ceylon, other species of the genus are African.

31.—Brachythemis contaminata (Fabr.).

1 ♂ Kandy, July, 13, 1910.

This species ranges over the whole of British India, Burma, Siam, and the Malay Peninsula to Sumatra and Java. It has not been recorded from Borneo.

32.—Neurothemis tullia (Drury).

1 ♂ Trincomalee, September, 1909. 4 ♂♂ Kandy, May, 1907, November, 1909.
10 ♂♂ Chilaw, January, 1910. ♂ Ambalangoda, February 28, 1911.
4 ♀♀ Chilaw, January, 1910. 4 ♀♀ Kandy, January, May, 1911.
1 ♀ Ambalangoda, February 28, 1911.

Common throughout India, Burma, and Indo-China; occurring also in Sumatra and Java. Individuals from Burma are some of them identical with the Indian and Ceylonese form, others seem to resemble rather the form described as *feralis* (Burma), but whether this form is a geographical race or an aberration is unsettled.

33.—Neurothemis intermedia intermedia (Ramb.).

4 ♂♂ 1 ♀ Kandy, July, 1909, November, 1909, January, 1910.

Similar to examples from Poona received from Major Fraser.

34.—† Rhodothemis rufa (Ramb.).

Erythemis rufa Kirby, "Dragonflies of Ceylon," p. 556,
Orthetrum oblitum id ibid., p. 554.
Pl. XLII., Fig. 3.

Ranges from Ceylon and India to New Guinea and North Australia. Apparently, however, not as a rule, on abundant species.

35.—* Sympetrum fonscolombei (Selys.).

1 ♂ Hakgala, Ceylon, August, 1911.

I have been able to compare this specimen with examples from the Nilgiri Hills, kindly sent me by Major F. C. Fraser, I.M.S. The extension of the range of this species to Ceylon is not perhaps surprising, but decidedly of interest.

Has been taken in Surrey, inhabits Central and South Europe, is recorded from Cape Town and elsewhere in Africa, from Asia Minor and Syria.

36.—† Trithemis kirbyi (Selys.).

Closely related to the African *T. ardens*. Ris regards the two as geographical races. I have seen examples from Poona, received from Major Fraser.

37.—Trithemis aurora (Burm.).

2 ♂♂ Kandy, July, 1909. 3 ♂♂ Haragama, July 15, 1910. 2 ♂♂ Haragama, May, 1911. 1 ♀ Trincomalee, December 9. 1900. 1 ♀ Kandy, June 25, 1910. 1 ♀ Haragama, July 15, 1910. 1 ♀ Haragama, May, 1911.

♂ H. W. 26 mm., abd. 24 mm; ♀ H. W. 25 mm., abd. 21 mm.

Similar in size to examples from S. India.

The species ranges over the Oriental region as far as Borneo.

38.—Trithemis festiva (Ramb.).

1 ♂ Trincomalee, November 1909, 2 ♂♂ (immature), Pundaluoya, November, 1909.

1 ♂ Kandy, July, 1909. 1 ♂ Galagedara, January, 1910. 1 ♂ Chilaw, January, 1910.

1 ♂ Haragama, May, 1911.

1 ♀ Pundaluoya, November, 1909 (immature).

This species is found through the Oriental region and as far as the Moluccas.

39.—* Trithemis pallidinervis (Kirby).

1 ♂, 1 ♀ Chilaw, January, 1910. 1 ♂ Hakgala, August, 1911.

This species does not figure in Kirby's list, but has been noted as occurring in Ceylon by Ris in his Monograph. Range from Burma through Peninsular India.

40.—* Zygonyx iris (Selys.).

Zygonidia ceylanica Kirby. Ann. Mag. Nat. Hist. (7) V., p. 533.

1 ♂ Haragama, July 15, 1910. 1 ♀ Haragama, July 15, 1910. 1 ♀ Kandy, January, 1908.

The male has less yellow on the sides of the thorax and on the second segment of the abdomen than has a specimen in my possession from the Nilgiri Hills, for which I am indebted to Major Fraser ; whilst the seventh segment of the abdomen is entirely black.

♂ Length of abdomen 35 + 2 mm., of hinder-wing 50 mm.

♀ Length of abdomen 45 mm., of hinder-wing 55 mm.

The species is recorded from the Nilgiri Hills, Bengal, Burma, Tonkin, Hainan, the Malay Peninsula, and Borneo.

41.—*† Onychothemis testacea ceylanica Ris.

I have not seen an example from Ceylon. I have, however, been able to examine a number of specimens from Tonkin and the Malay Peninsula. Major Fraser tells me (*in litt.*) that he has recently captured an *Onychothemis* in the Nilgiri Hills. This is probably closely allied to the Ceylon race.

42.—Tholymis tillarga (Fabr.).

1 ♂ Kandy, December 9, 1909.

The species is well-nigh cosmopolitan.

43.—Pantala flavescens (Fabr.).

4 ♂♂, 1 ♀ Jaffna, September, 1911. 1 ♂, 1 ♀ Trincomalee, September, 1909.

Range, cosmopolitan.

44.—Tramea basilaris burmeisteri Kirby.

Tramea burmeisteri Kirby, "Dragonflies of Ceylon," p. 548.

1 ♂ Chilaw, January, 1910.

The species ranges from Tropic Africa through India to Tonkin, the sub-species is the Asiatic form.

45.—Tramea limbata (Desjardins).

Tramea stylata Kirby, "Dragonflies of Ceylon," p. 548.

1 ♂ Peradeniya, November, 1902. 1 ♂ Trincomalee, September 8, 1909.

1 ♂ Puttalam, January, 1910. 1 ♂ Jaffna, September, 1911.

This species ranges over pretty well the whole of the old world Tropics reaching even Samoa and the Fiji Islands.

46.—Hydrobasileus croceus (Brauer).

Hydrobasileus extraneus Kirby, "Dragonflies of Ceylon," p. 547, Pl. XLI., Fig. 1.

1 ♀ Kandy, May, 1909.

Recorded from Burma, Tonkin, Cambodia, the Malay Peninsula, and islands, as far as the Celebes and the Moluccas.

47.—† Zyxomma petiolatum (Ramb.).

Ranges as far as the Malay Peninsula and Sumatra, but is not apparently an abundant species.

48.—Rhyothemis variegata (Linn.).

8 ♂♂ Chilaw, January, 1910. 14 ♀♀ Chilaw, January, 1910.

This species is found throughout India and ranges across Burma into China. In the Malay Peninsula and generally in the south-east it is replaced by *R. phyllis* Sulzer.

49.—Rhyothemis triangularis (Kirby).

Rhyothemis lankana Kirby, "Dragonflies of Ceylon," p. 459.

2 ♂♂ Kandy, May, 1910. 3 ♀♀ Kandy, May, June, 1910.

I have compared these specimens with examples from Borneo and the Malay Peninsula, and cannot find any distinguishing features.

50.—Urothemis signata signata (Ramb.).

Urothemis sanguinea. Kirby, " Dragonflies of Ceylon," p. 552.

1 ♂, 2 ♀♀ Jaffna, June, 1910. September, 1911.

This species ranges over the whole of the Oriental region, and as far as New Guinea. The sub-species is apparently confined to the continental area of the region.

51.—† Macrodiplax cora (Brauer).

Urothemis vittata Kirby, " Dragonflies of Ceylon," p. 552, Pl. XLII., Fig. 2.

The British Museum possesses several examples of this species from Ceylon. It ranges from Madagascar to Queensland. Perhaps breeds in brackish water.

SUB-ORDER : Zygoptera.

Sub-family : **Libellaginae.**

52.—Micromerus finalis (Selys.). (Text Fig. 4.)

Micromerus finalis Kirby, Cat. Odonata, p. 115.

1 ♂ Kandy, November 26, 1909.

Length of abdomen 16 mm., of hind-wing 21 mm.

The single fully adult male agrees closely with the type male in the British Museum, with which I have compared it.

Head, upper lip black, anteclypeus metallic blue, postclypeus black, frons with two pairs of pale yellow spots, genae with small yellow markings. Occiput with a small post-ocular spot on either side, also yellow.

Prothorax black, posterior margin yellow in the centre, and a yellow spot on either side.

Synthorax black, mid-dorsal carina finely marked with yellow; on either side of this is a yellow dorsal line, narrow, but widening anteriorly, not reaching the alar series.

There is a trace of a yellow line at the upper end of the humeral suture. Side yellow margined with black, and with a black band along the second lateral suture. This band gives off an angular projection in its upper half, which encroaches on the yellow of the metepisternite. Ventral surface black.

Legs: all three pairs of femora with yellow on the anterior surface of the upper half. Below this pruinose; tibiae also pruinose anteriorly.

Fig. 4.—Diagrammatic representation of colour-pattern of first four segments of abdomen of *Micromerus finalis* ♂.

Abdomen black, first segment with yellow apical band transversely on the dorsal side. Segments 2–7 with paired dorsal spots.

These are small on the second segment. Then increasing on 3·4, becoming smaller again on 5·6 and almost obsolete on 7.

In addition 2-5 have a series of lateral ventral spots on either side; these coalesce in each case with the anterior end of the corresponding dorsal spot.

Wings tinged with saffron towards the base. The fore-wing is without a pterostigma, and has a dark spot at its apex covering about 3 mm. of the length of the wing. Seven antenodal cross-nerves.

53.—* Micromerus greeni n. sp. (Text Fig. 5.)

1 ♂ Haragama, August, 1903. 2 ♂♂ Haragama, June 5, 1910.

1 ♂ Peradeniya, June 5, 1910. 1 ♂ Peradeniya, July 10, 1910 (this specimen is the type).

1 ♂ Kandy, November 26, 1909. 1 ♂ Kandy, December 9, 1909.

Type ♂ deposited in the British Museum.

This little species is a member of the same group as *M. lineatus* but resembles rather *M. aurantiacus* Selys., of Borneo, in colouring.

It is, however, quite distinct and appears to be undescribed. Length of hind-wing 18 mm., of abdomen 14 mm.

Head black, apex of clypeus metallic blue ; a small yellow spot on either side enternal to the base of the antennæ, and a small yellow spot on either side of the posterior ocelli ; a few transverse lines of the same colour across the occiput and minute postocular spot, interior yellow, *prothorax* black with yellow marks on the sides, and a median posterior spot of the same colour.

Dorsum of *synthorax* black, the mid-dorsal carina narrowly marked out in yellow, a dorsal line of yellow on either side of it immediately to the median side of the humeral suture ; this line narrows posteriorly and does not reach the wing base. The upper part of the humeral suture shows a trace of a yellow line.

Side of synthorax yellow margined behind and below with black, and with a band of black along the second lateral suture. The upper half of this band expands anteriorly so as to encroach largely on the yellow of the upper part of the metepimerite.

Fig. 5.—Colour pattern of abdomen of *Micromerus greeni* ♂.

The ventral surface of the synthorax is black.

The *legs* are black, the upper half of the first two pairs of femora are marked with yellow anteriorly, the anterior surface of the third pair and of the tibiæ pruinose.

The *abdomen* is black, the first segment has an apical transverse band of yellow on the dorsum. The colour pattern of the segments 2–8 consists of paired dorsal and lateral ventral spots, the spots on segments 2·3 are orange coloured, those on the other segments brick-red.

The dorsal spots on segment two are small, and coalesce externally with the larger lateral ventral spot. The dorsal spots on 3·4·5 are progressively larger, whilst the lateral spots, coalescing with them anteriorly are progressively smaller.

On 6·7·8 the dorsal spots cover nearly the whole of the dorsum of each segment, the lateral ventral spots are of about the same size as in segment 5, but not well defined. Lastly, segments 9·10 have small, not very well defined, dorsal spots.

The wings are tinged with yellow, especially the hinder pair and towards the base. The anterior pair, which are without a pterostigma have the apex marked for a length of about 3 mm. with a black spot which has a metallic lustre. There are six antenodal nerves in the fore-wing.

A young male from Haragama, with quite immature colouring, has the dorsum of the ninth segment very largely marked with yellow, whilst the whole of the dorsum of the tenth segment is likewise yellow.

54.—Micromerus lineatus (Burm.).

Micromerus lineatus Kirby, Cat. Odonata, p. 115.

1 ♂ Haragama, July 18, 1910.

Length of hind-wing 18 mm., antenodal 5 6.

This specimen, which I have compared with a series in Mr. E. B. Williamson's collection from Candervalay, lacks the yellow tinge of the base of the wing characteristic of the males of other species from Ceylon. The brilliant canary yellow of the abdomen (segments 2·5) renders this little species very conspicuous.

Fig. 6.—Diagrammatic representation of colour-pattern of first four segments of abdomen of *Micromerus lineatus* ♂ from Ceylon.

The species stands badly in need of careful examination. Specimens from Poona and Ceylon differ strikingly from examples from Burma and Siam, &c. Perhaps the Indian specimens ought to be called *M. obscurus* Kirby, or they may more probably be found to belong to a recognizable geographical

race of this widely ranging species. Specimens in the British Museum from Ceylon have been labelled by Martin as *M. lineatus ceylanicus*, but the name is, of course, so far only a manuscript one.

Micromerus sp. ♀♀.

I cannot satisfy myself as to the species, one or more, to which these specimens should be referred. They are mostly much faded in colouring, or else immature. Probably all of them are *M. lineatus* and (or) *M. greeni*. It is quite likely that the females of these two species are even when alive very similar in appearance, and I do not find it possible to come to any satisfactory opinion on the examples before me.

Sub-family : **Calopteryginae.**

55.—Neurobasis chinensis (Linn).

N. chinensis Kirby, Cat. Odonata, p. 102.

3 ♂♂ Haragama, August, 1903, 1 ♂ Haragama, September, 1909. 2 ♂♂ Haragama, July 17, 1910.

6 ♂♂ Kandy, November 26, 1909. 1 ♂ Kandy, July, 1910. 1 ♂ Kandy, May, 1909.

3 ♂♂ Galagedara, January, 1910. 1 ♂ Gonagama, October, 1909. 1 ♂ Peradeniya, July 10, 1910.

3 ♀♀ Haragama, August, 1903. 5 ♀♀ Haragama, November and December, 1909. 3 ♀♀ Galagedara, January, 1910.

2 ♀♀ Kurunegala, January, 1910. 2 ♀♀ Haragama, May, 1911. 1 ♀ Kandy, November 26, 1909.

1 ♀ Peradeniya, July, 1910.

Found all over the Oriental region, haunts especially fairly wide rapidly flowing rivers.

56.—Vestalis apicalis (Selys.).

Vestalis apicalis Kirby, "Dragonflies of Ceylon," p. 558.

5 ♂♂ Kandy, July, November, 1909. 1 ♂ Ratnapura, October, 1909. 1 ♂ Kandy, July 8, 1910.

1 ♂ Haragama, July 18, 1910.

2 ♀♀ Kandy, October-November, 1909. 1 ♀ Peradeniya, December 29, 1910.

The females are entirely without the dark apical mark on the wing. Females from the Nilgiri Hills have this dark marking at any rate in a certain number of specimens.

I think *apicalis* must be regarded as a local race of *gracilis* Selys, a species with an extensive range on the mainland of tropical Asia which, however, does not reach so far south as the Malay Peninsula, where it is replaced by the distinct, though closely allied, *V. amoena*. Selys.

The British Museum possesses a pair of *vestalis* from Tonkin evidently closely similar to *apicalis*, which name has in fact been given them by Major Fraser. I should be inclined to regard them as another local race of *gracilis*, not necessarily identical with the South Indian and Ceylon form *apicalis*; but I have not had an opportunity of studying them with sufficient care.

Sub-family : **Epallaginae.**

57.—Pseudophaea splendens (Selys.).

Pseudophaea splendens Kirby, "Dragonflies of Ceylon," p. 559.
P. carissima Kirby, loc. cit. p. 559, Pl. XLII., Fig. 4.

4 ♂♂, 4 ♀♀ Hatton, May 27, 1911. ♂ h. w. 35 mm., abd. 42 mm. ♀ h. w. 37 mm., abd. 37 mm.

4 ♂♂, 2 ♀♀ Pundaluoya November, 1909. ♂ h. w. 32 mm., abd. 40 mm. ♀ h.w. 32·5 mm., abd. 33 mm.

1 ♂, January, 1908. 1 ♂, May, 1909. 2 ♂♂, August, 1909, 2 ♀♀. December, 1910, Kandy. ♂ (largest) h. w. 30. (smallest) h. w. 27. ♀ h. w. 31 mm., abd. 31 mm.

8 ♂♂, 1 ♀, 15·17, July, 1910. 2 ♂♂, April 21, 1911 Haragama. ♂ h. w. 27·29 mm., abd. 37 mm.

1 ♂ Kurunegala, January, 1910. 1 ♂ Goragama, October, 1909. Similar in size to Haragama specimens.

8 ♂♂ Galagedara, January, 1910. h. w. 28 mm., abd. 38 mm.

I have examined the type-specimen of *P. carissima*, Kirby, in the British Museum and can find no structural differences between it and *splendens*, and in view of the considerable

differences in size existing in the series before me, I am strongly inclined to regard *carissima* as merely a small phase of *splendens*. I think it possible that Kirby may have been misled by examining specimens with closed wings, as the under surface of the hind-wing is lacking in the brilliant green reflex seen on the dorsal surface of the same wing, to which perhaps is to be ascribed his var. *viridis*.

Splendens does not seem to be at all closely related to *dispar* Selys. and *fraseri* Laidlaw from the Nilgiri Hills. Its affinities are rather with Malayan species, such as *variegata* Selys.

Sub-family : **Lestinae.**

58.—Lestes elata Selys.

Lestes elata Laidlaw, Rec. Indian. Mus., XIX., 4., p. 153, Text Fig. 2., Pl. V., Fig. 5.

3 ♂♂ Puttalam, January, 1910. 1 ♂ Pundaluoya, November 15, 1909.

2 ♀♀ Kandy, September, 1907. November 26, 1909.

A typical Indian species ranging from Ceylon, through India to Assam and Burma.

59.—† Lestes decipiens Kirby ?

Lestes decipiens Kirby, " Dragonflies of Ceylon," pp. 565-566.

I cannot separate the type of this species from *L. praemorsa* Selys., a species common in India and Indo-China as far as the Malay Peninsula. However, *praemorsa* appears to show some constant local variations, so Kirby's name should remain, pending more detailed study.

60.—† Lestes orientalis Selys.

Lestes orientalis Kirby, Cat. Odonat., p, 163.

Recorded from Ceylon only. Its size suggests that this is possibly allied to *Orolestes*.

61.—Lestes gracilis gracilis (Selys.). (Text Figs. 7*a*, 7*b*.)

Lestes gracilis gracilis Ris, Supplementa. Entomol., No. 5, pp. 14–15.

9 ♂♂ Hakgala, August, 1911. 1 ♂ Maskeliya, 4,500 ft., April 4, 1901.

1 ♂ Hewaheta, March 6, 1910. 3 ♀♀ Hakgala, August, 1911. 1 ♀ Hakgala, August 29, 1909.

The sub-species is recorded from Ceylon only, the race *birmanicus* from S. India and Burma ; and the race or sub-species *peregrinus* Ris, from Japan.

Fig. 7a.—Anal appendages of *Lestes gracilis gracilis* ♂ lateral view.

Fig. 7b.—Colour pattern of dorsum of second abdominal segment of *Lestes gracilit gracilis* ♂.

62.—Lestes divisa (Selys.). (Text Figs. 8*a*, 8*b*.)

Lestes divisa Kirby, Cat. Odonata, p. 163.

4 ♂♂ Kandy, May, 1909 ; 1 ♂ Kandy, May, 1910 ; 1 ♂ Kandy, July 3, 1910.

1 ♀ Kandy, May, 1909.

Recorded from Ceylon only.

The species is exceedingly like *L. gracilis*, and with it, belongs to the section of the genus *Lestes* which is characterized

especially by the extremely acute outer angle of the quadrilateral. Other species similarly characterized, and presumably all to be included in the same section are the Himalayan *L. cyanea* Selys., and Australian species of the genus, as well as the European *Lestes* (*Sympecma*) *fusca*. I do not at present propose to adopt either of the generic names suggested for members of this section, viz., *Austrolestes* Tillyard, *Ceylonolestes* Kennedy.

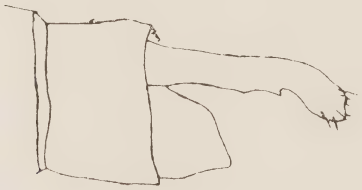

Fig. 8a.—Anal appendages of *Lestes divisa* ♂, lateral view.

Fig. 8b.—Colour pattern of dorsum of second abdominal segment of *Lestes divisa* ♂.

As noted in the Selysian Synopsis *L. divisa* differs from *L. gracilis* as follows :—

L. divisa—

(i.) Upper surface of head bronze.

(ii.) Dorsum of synthorax greenish bronze; this colour narrows anteriorly.

(iii.) Dark dorsal mark of first segment of abdomen metallic-green, touching both ends of the segment.

(iv.) The dark basal mark of the ninth segment of the abdomen of the male ends in a *backwardly directed point*, instead of being forked, in the female the whole segment is dark.

(v.) Upper anal appendages of the male yellow at their middle; the internal dilatation begins gradually, not suddenly, with a spur which is longer than in *gracilis*. Apex of these appendages shorter, rounded, not lancet-shaped; without a tubercle below.

(vi.) The pterostigma is slightly shorter

Of these characters (i.) and (ii.) are perhaps not of much importance, and may depend on the maturity of the specimens. The remaining points are quite constant. I find that the pattern of the second abdominal segment is the readiest guide to identification (see Text Fig. 8*b*).

As to the female the single *divisa* ♀ from Kandy is very immature, so that I cannot speak with certainty save that the character of the pterostigma holds good.

Sub-family : **Platystictinae.**

A.—Rather large species. (*Hind-wing 30 mm. or more.*) *Sectors* M_5 *and* M_4 *much angled, so that many of the cells are markedly pentagonal.* M_{1+3} *and* M_4 *leave the arculus separately.* M_3 *leaves the common trunk considerably before the level of the cross-vein descending from the nodus.*

PLATYSTICTA.

B.—Rather smaller species (*Hind-wing 25·28 mm.*) *sectors* M_5 *and* M_4, *not angled, so that most of the cells about them are quadrangular.* M_{1+4} *and* M_4 *leave the arculus by a common stalk.* M_3 *leaves the common trunk immediately before the level of the cross-vein descending from the nodus.*

DREPANOSTICTA.

The genus Platysticta is confined to Ceylon and South India, and is one of the most interesting of the fauna. Its nearest ally is the South American *Palaemnema*.

Ceylon has two species of *Platysticta*, South India (Cochin State) has one. These insects are probably very primitive and a knowledge of the larval form is much to be desired.

The two Ceylonese species are readily distinguishable by the fact that *P. apicalis* has the apices of the wings from the

level of the pterostigma tinged with brownish-black, whilst the wings of *P. maculata* are colourless. Both species have the thorax black; whilst in *P. deccanensis* from South India this structure is of a cinnamon-brown colour.

63.—Platysticta apicalis Kirby.

Platysticta apicalis Kirby, "Dragonflies of Ceylon," p. 561, Pl. XLII., Fig. 1.

64.—† Platysticta maculata Selys.

Platysticta maculata Kirby, "Dragonflies of Ceylon," p. 561. *greeni* Kirby, Proc. Zool. Soc., Lond., 1891, p. 204., Pl. XX., Fig. 3.

P. maculata Kirby, Cat. Odonata, p. 132.

65.—Drepanosticta digna (Selys.). (Text Fig. 9.)

Platysticta digna Kirby, "Dragonflies of Ceylon," p. 562.

1 ♂ Haragama, May, 1911. 1 ♀ Haragama, August, 1903. (allotype.)

♂ Differs from the description of the type in having the distal third of the eighth segment of the abdomen coloured blue dorsally, whereas the type is said to have this segment entirely black. The sides of the synthorax, along the first lateral suture is blue.

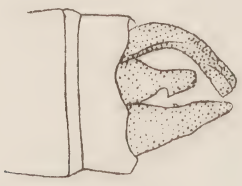

Fig. 9.—Anal appendage of *Drepanosticta digna* ♂ seen from the side obliquely.

♀ Colouring as in the male. Eighth segment of abdomen shorter than the ninth, its apex narrowly marked with blue

dorsally. Segments 9·10 likewise blue above. The tenth segment is truncate posteriorly.

♂ Length of abdomen 34 mm., of hind-wing 21·5 mm.

♀ Length of abdomen 31·5 mm., of hind-wing 23 mm.

66.—† Drepanosticta tropica (Selys.).

Platysticta tropica Kirby, "Dragonflies of Ceylon," p. 562.

67.—† Drepanosticta montana (Selys.).

Platysticta montana Kirby, "Dragonflies of Ceylon," p. 562.

68.—† Drepanosticta hilaris (Selys.).

Platysticta hilaris Kirby, "Dragonflies of Ceylon," p. 562.

Drepanosticta sp.

Drepanosticta sp. (Text Figs. 10, 11.)

4 ♂♂, 4 ♀♀ Kandy, June–July, 1907, 1909, 1910.

These specimens do not agree exactly with any of the Selysian species.

♂ *Head* dull black, except the upper lip which is pale blue, the margin black.

Prothorax bronze-black above, paler at the side and below, posterior margin with obtuse lateral angles.

Thorax bronze-green on the dorsum, the sides bronze-brown, fading ventrally to pale yellow. Immediately behind the first lateral suture a line of dull blue can be distinguished in the best preserved specimens, the metepimeron also appears bluish-yellow.

Legs dull yellow, darker at the articulations.

Abdomen dark-brown with suggestion of bronze, ventral surface a little lighter in tint. Segments 3–7 have each a pair of basal dorsal spots of a pale yellow colour. Dorsum of segments 9·10 (and in one case a small terminal mark on 8) blue. Anal appendages brown, upper pair stout, sharply

angled downward at their middles, the distal half carrying a ventral blade like edge. Lower pair shorter, very stout at base, narrowing rapidly to become very slender and thread-like, directed straight backwards. A stray short tooth projects backward from the upper part of the base of each.

Fig. 10.—Anal appendages of *Drepanosticta* sp. ♂ (Kandy) seen from the side.

♀ Rather larger and more stoutly built than is the male. Colouring generally similar, but segments 8·9·10 of abdomen are dark-brown, one specimen shows indication of a light (probably blue) mark on the base of the ninth segment dorsally. Apex of 10 truncate.

Wings: Pterostigma slightly longer than it is broad, dark-brown in colour with narrow pale margin.

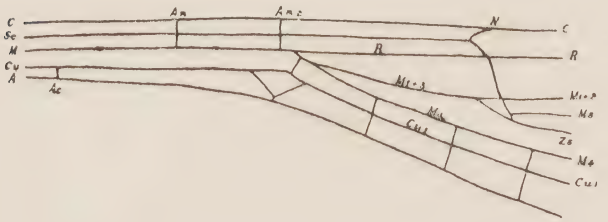

Fig. 11.—Base of R fore-wing of *Drepanosticta* sp. ♀ (Kandy) diagrammatic.

A. = Anal vein, Ac. = anal crossing, Zs Zygopterous sector (= radial sector of Comstock and Needham). In this Zs rises from vein descending from Nodus, N.

M_{1+3} and M_4 with a very short common stalk at arculus. M_3 generally rises a little before the level of the cross-vein descending from the nodus, and Zs immediately after, but in the case of one female Zs rises on all four wings from the cross-vein. Post-nodals 15·17.

♂ Length of abdomen 37·5 mm., of hind-wing 22·5 mm.

♀ Length of abdomen 36 mm., of hind-wing 26 mm.

This species is perhaps identical with *P. hilaris* Hagen, but without confronting specimens I cannot be sure.

Drepanosticta sp.

1 ♂ 1 ♀ Pundaluoya, April, 1898.

Too damaged to identify. The pterostigma is about twice as long as broad.

Sub-family : **Platycneminae.**

Series : Platycnemis.

69.—Copera marginipes (Ramb.).

Copera marginipes Kirby, "Dragonflies of Ceylon," p. 560.

2 ♂♂ July–September, 1907. 2 ♂♂ November, 1909. 2 ♂♂ June, 1910. 2 ♂♂ July, 1910. 1 ♂ January 3, 1911—all from Kandy. 1 ♂ Avissawella, October 5, 1909.

2 ♀♀ Peradeniya, July 6, 1907.

2 ♀♀ May, 1907. 3 ♀♀ July, 1907. 3 ♀♀ September, 1907. 1 ♀ May, 1910—all from Kandy. 1 ♀ December, 1900. Trincomalee.

I have also examined a long series of specimens in Mr. E. B. Williamson's collection. Apparently the only form of the genus found in Ceylon.

The specimen labelled *serapica* in the British Museum is unidentifiable. *Marginipes* ranges throughout tropical continental Asia to Java and Sumatra. I have never seen specimens from Borneo.

Series : Disparoneura.

70.—Disparoneura tenax (Selys.). (Text Fig. 12.)

Disparoneura tenax Kirby, "Dragonflies of Ceylon," p. 562, Pl. XLI., Fig. 2.

1 ♂ Diyatalawa, July 14, 1901. 4,200 feet.

" Eyes ruby, mouth parts the same, scarlet line between eyes at vertex.

Thorax velvety-black with three scarlet lines on either side. Body black, junction of segments dark, steel blue."

Abd. 36 mm. H. W. 27 mm.

Fig. 12.—Anal appendages of *Disparoneura tenax* ♂ seen from the side.

Perhaps the largest of the Disparoneuras, almost equal in size to *Indoneura gomphoides* Selys. It is a true Disparoneura with the specialized prothorax in the female.

71.—Disparoneura caesia (Text Fig. 13).

Disparoneura caesia Kirby, "Dragonflies of Ceylon," p. 562.

3 ♂♂ Kandy, July and December.

1 ♂ 1 ♀ Peradeniya, May.

I have compared these specimens with examples in the British Museum.

The males are entirely black, with violet reflex, most noticeable on the sides of the synthorax. None show much pulverulescence, though all appear fully mature. H. W. 20 mm., abd. 30 mm.

Fig. 13.—Anal appendages of *Disparoneura caesia* ♂ seen from the side.

The female (allotype) is black in colour, without violet reflex and with yellow markings as follows : Genæ, ante- and post-clypeus ; a narrow line on either side of the prothorax, interrupted posteriorly ; two oblique bands on either side of the synthorax. There are also yellow marks laterally on segments 1·2·3 and 8·9 of the abdomen, which is brown ventrally from 2–7. The coxae and anterior surface of the femora are marked with yellow.

The posterior margin of the prothorax bears a pair of short processes directed upwards and backwards. H. W. 20 mm., abd. 25 mm.

This species differs from its allies in having no markings on the vertex or occiput in either sex.

72.—† Disparoneura centralis (Selys.).

Disparoneura centralis Kirby, " Dragonflies of Ceylon," p. 502.

73.—† Disparoneura oculata Kirby.

Disparoneura oculata Kirby, " Dragonflies of Ceylon," pp. 502–503.

74.—Caconeura sita (Kirby). (Text Figs. 14*a*, 14*b*).

Disparoneura sita Kirby, "Dragonflies of Ceylon," p. 563.

3 ♂♂ Trincomalee, December 9, 1900. 1 ♂ Kandy, July 11, 1910.

Length of abdomen 28 mm., of hind-wing 17·5 mm.

Fig. 14A.—Anal appendages of *Caconeura sita* ♂ seen from the side and a little obliquely.

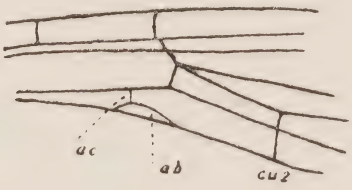

Fig. 14B.—Part of wing-base of fore-wing of *C. sita* ♂ diagrammatic, ac = anal crossing or anal cross-vein, ab = anal bridge, which is *incomplete*, *i.e.*, does not reach Cu_2, the vein descending from the distal end of the quadrangle.

I group in the genus *Caconeura* those species of the series *Disparoneura* in which the vein known as the anal bridge (Ab.) is incomplete as in the Ceylon species and in some species from Malaya, or where it is altogether missing as in many Malayan species. I retain in *Disparoneura* those species in which this vein is complete, *i.e.*, reaches the cross-vein descending from the distal end of the quadrangle. Papuan species showing a similarity to *Caconeura* in this respect are generally separable by the different relative position of the end cross-vein (Ac.).

75.—* † Caconeura mackwoodi (Fraser).

Caconeura mackwoodi Fraser, Journ., Bombay, Nat. Hist. Soc., XXVI., p. 875.

Distinguished from *C. sita* by its slightly larger size (hind wing 21 mm.) and by the absence of white markings on the dorsum of the synthorax.

Sub-family : **Agrioninae.**

76.—Aciagrion hisopa Selys.

Pseudagrion ? hisopa Kirby, Cat. Odonata, p. 153.

Aciagrion hisopa Selys., Ann. Mus. Civ. Genova, X., 1891, p. 82.

3 ♂♂ Trincomalee, September, December, 1900. 2 ♂♂ Kandy, May, 1907. 1 ♂ Kandy, May, 1909. 1 ♂ Puttalam, January, 1910.

1 ♀ Trincomalee, December 9, 1920.

Ranges through India to Burma and Lower Siam. The Ceylon specimens are remarkably small, and differ from typical examples of *hisopa* in having a black mark on the dorsum of the eighth segment of the abdomen in the male. In size and general appearance they approximate to *A. bo neense* Ris, the smallest species of the genus, which is itself possibly an extreme race of *hisopa*. Mr. Green's specimens agree closely with an example from Cochin which I regarded as belonging to a distinct race *occidentale*. Fraser has described (*loc. cit.*) a race from Mahableshawar as race *krishna*. The Ceylon specimens differ chiefly from the specimen from Cochin State in their slightly smaller size. In view of the tendency which this species shows to develop local races, it is quite likely that the Ceylon form may ultimately require recognition.

♂ Length of abdomen 21 mm., of hind-wing 13·5 mm.

♀ Length of hind-wing 13·5 mm.

Post-nodal cross nerves on fore-wing 9.

77.—† Onychargia atrocyana Selys.

Onychargia atrocyana Kirby, " Dragonflies of Ceylon," p. 563.

I have seen examples from Burma, and from Borneo, which is probably its eastern limit. Major Fraser tells me (*in litt.*) that he has specimens from Coorg.

78.—Ischnura senegalensis (Ramb.).

Micronympha senegalensis Kirby, " Dragonflies of Ceylon," p. 546.

1 ♂ Trincomalee, September 8, 1909.

Ranges over the whole Oriental region.

79.—Ischnura aurora (Brauer).

Micronympha aurora Kirby, " Dragonflies of Ceylon," p. 564.

1 ♂ Kandy, May, 1907. 1 ♂ Hakgala, August, 1911. 1 ♀ Peradeniya, February 17, 1911 ; " caught at light."

Ranges from India and Ceylon to New Caledonia and Fiji.

80.—Ceriagrion cerinorubellum (Brauer).

Ceriagrion cerinorubellum Kirby, Cat. Odonata, p. 154.

1 ♂ Undugoda, August 29, 1909. 1 ♀ Ambalangoda, March 1, 1911.

This species ranges as far as East Borneo.

81.—Ceriagrion coromandelianum (Fabr.).

Ceriagrion coromandelianum Kirby, Cat. Odonata, p. 154.

1 ♂ Trincomalee, December 30, 1900. 3 ♂♂ Trincomalee, September 8, 1909.

1 ♂ Kandy, May, 1893. 2 ♂♂ Kandy, July 10, 1910. 1 ♂ Chilaw, January, 1910.

2 ♂♂ Puttalam, January, 1910.

1 ♀ Chilaw, January, 1910. 1♀ Trincomalee, September 3, 1909. 1 ♀ Jaffna, September, 1911.

♂ Kandy, " Thorax bright green, darker above ; head reddish above, yellow below, eyes green ; abdomen gamboge yellow."

One of the commonest of Oriental species ; ranges to Sumatra and Java.

82.—Pseudagrion rubriceps Selys.

Archibasis ceylonica Kirby, "Dragonflies of Ceylon," p. 564.
Pseudagrion rubriceps Kirby, Cat. Odonata, p. 153.

Pseudagrion rubriceps Laidlaw, Rec. Indian Museum, XVI., Pt. II., p. 194.

1 ♂ Trincomalee, September 8, 1909. 2 ♂♂ Kandy, July 10–11, 1910.

2 ♀♀ July 10-11, 1910.

Common in Peninsular India; ranges as far as Java, but is not known from Borneo.

83.—* Pseudagrion sp. (Text Figs. 15*a*, 15*b*.)

1 ♂ Batticaloa, August, 1911. (In excellent preservation.)

Colour generally greenish-blue, with black markings.

Head: upper lip, ante- and post-clypeus olive-brown. The rest of the anterior surface of the head blue, as far as the level of the anterior ocellus. Dorsal surfaces black, with large post-ocular spots of blue.

Prothorax blue at the sides and below; black above, with paired blue spots.

Synthorax: dorsum black, with broad antehumeral bands of blue; sides and ventral surface blue. Legs: femora blue with broad black band on posterior surface, tibiæ and tarsi brownish-yellow with black apices.

Abdomen: first segment blue, with square dorsal mark of black colour at its base. Second segment blue with a black mark shaped like a goblet with a short stem, the foot of the stem resting on the apex of the segment. There is also a fine longitudinal line of black extending in the middle line to the base of the segment. Segments 3·6 are blue laterally and ventrally, each with a longitudinal bronze-black band on the dorsum. This band is finely pointed anteriorly and does not reach the base of the segment, apically it widens suddenly close to the margin to form a black ring encircling the end of the

segment. Segment 7 has a similar black band, which is however wider, blunt anteriorly ; segments 8·9 are entirely blue save for a narrow apical ring of black, whilst segment 10 is blue with a square black mark covering the dorsum.

Length of abdomen 30 mm., of hind-wing 21 mm.

Fig. 15A.—Anal appendages of *Pseudagrion* sp. ♂ seen from the side.

Fig. 15B.—The same viewed from above.

Anal appendages black. Upper pair not bifid, irregularly triangular in outline when viewed from the side. Each is strongly hooked inwards at its apex, and has a shelf-like projection on its inner side.

The lower pair are conical, looked at laterally. When viewed from above each is seen to carry a short inwardly directed tooth near its apex.

This species is very like *P. microcephalum* at first sight. It is readily distinguished by the non-bifid upper anal appendages, which are quite unlike those of the form of *microcephalum* found in Ceylon. Since only a single specimen is included in the collection, I think it wise to leave its exact status undefined.

84.—Pseudagrion microcephalum (Ramb.).

Pseudagrion microcephalum Kirby, "Dragonflies of Ceylon," *Pseudagrion microcephalum* Ris, Supplementa Entomol., No. 5, pp. 40–43. Text Fig. 13·19.

1 ♂ Trincomalee, January 2, 1901.

"Eyes pale blue, mouth blue, thorax black with blue lateral stripes. Body olive-green, end of segments pale blue; last two segments pale blue divided by black line. Legs and under-surface of body and thorax pale bluish-white."

Common in India and found throughout the Oriental region and as far as Queensland.

85.—* Enallagma malayanum Selys.

Enallagma malayanum Kirby, Cat. Odonata, Ris, in L. Schultze, Forschungsreise in wesentlichen a. zentralen Südafrika 1903–1908, Gustav Fischer Jena, 1908, p. 313.

1 ♂ Trincomalee, September 21, 1910.

First recorded for Ceylon by Ris (*loc. cit.*), otherwise known only from Java.

86.—Agriocnemis pygmaea Selys. (Rambur ?).

Agriocnemis pygmaea Ris, Supplementa Entomol. No. 5, 1916., pp. 20–22.

Agriocnemis velaris Kirby, "Dragonflies of Ceylon," p. 564.

3 ♂♂ Trincomalee, January 10, 1901. ("Thorax striped alternately with black and pale green. Body upper side dark olive-green, under side pale green, last segments rufous") 1 ♂ Trincomalee, September 8, 1909.

1 ♂ Ambalangoda, February 28, 1911. 2 ♂♂ Peradeniya, May 4, 1911.

2 ♀♀ Trincomalee, December 9, 1900 (orange). 1 ♀ Ambalangoda, November 28, 1911 (orange).

1 ♀ Trincomalee, September 4, 1910 (green).

Ranges from Ceylon and India to Queensland.

87.—† Agriocnemis femina Brauer.

Agriocnemis femina Ris, Supplementa Entomol, No. 5, 1916, pp. 22–26, Text Fig. 3·7.

Recorded by Ris for Ceylon. Occurs throughout the Oriental region and as far as the islands of Torres Straits.

88.—* ? Genus ? Species.

A single ♀ Ambalangoda, March 1, 1911.

In its general characters this specimen comes near the group to which *Agriocnemis* belongs. It has the arculus well distal to the second antenodal nerve, the quadrangle rather short, and with its distal side not very oblique; the wing ceases to be petiolated well before the level of Ac, and there is no apical spur on the sternite of the eighth segment of the abdomen.

The size is a little larger than in *Agriocnemis*, and the colouring is different. Generally speaking it is rich brown with pale (? blue) post-ocular linear marks, the sides of the synthorax pale brown shading ventrally to pale blue.

Legs pale brown, with dark brown apices.

Segments 2·8 of abdomen with small triangular, basal mark of blue on the dorsum, this mark is largest on the eighth segment.

Possibly this specimen is allied to *Mortonagrion* of Fraser; the posterior margin of the prothorax is similar to that found in females of *M. varralli* Fraser, and the colouring is similar. The wings are slightly tinged with brown.

H. W. 12·5 mm., abd. 20·5 mm.

The species noted below have been omitted from the list.

Neurothemis ceylanica (Brauer).

This is regarded by Ris as a name applied to a race or variety of *N. fluctuans* a Malayan species which does not occur in Ceylon.

Rhyothemis phyllis (Selys.).

Given in his list by Kirby on the authority of de Selys. The species is Malayan and its occurrence in Ceylon improbable.

ADDENDA.

Since these notes were written I have named and described the *Heterogomphus* (No. 10, of this list) as *Heterogomphus ceylanicus*, in an account of the Gomphine dragonflies of India. (Laidlaw, Rec. Ind. Mus., XXIV., p. 412, 1922). The Nilgiri species captured by Major Fraser is quite distinct therefrom.

The race of *Indothemis limbata* (No. 28) has been named by Mr. Campion *Indothemis limbata Sita*. (Ann. Mag. Nat. Hist., 9, XI., p. 28, Text Fig. 1923).

Lastly the specimens listed above as *Aciagrion hisopa* (No. 76) belong rather to a distinct species *A. occidentale* Laidlaw, found also in S. India. A full description of this and of some other species of the genus is now awaiting publication. Reference should here be made to a series of papers written by Major Fraser and published in 1922–23 in the Journal of the Bombay Natural History Society, entitled Dragonfly collecting in India.

He has listed 354 species for India and Ceylon ; a very large increase on all previous lists. As his additions are entirely Indian, and as even since the completion of the last part of his series published in December, 1923, he has, I believe, secured about ten further unrecorded or new species, it is evident that careful collecting will add to the Ceylon list very considerably.

NEW CEYLON DIPTERA.

Part III.

By Ronald Senior-White, F.E.S., F.R.S.T.M. & H.

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I HAVE included in this part the descriptions of several Diptera from India, which have been sent me from time to time for determination, as, though not yet known from Ceylon, they are quite likely to occur here also.

Mycetophilidae.

Platyroptilon talaroceroides S.-W.

This insect, which I described in the first part of this paper as a *Platyura*, should be transferred to the above genus, on the authority of Mr. F. W. Edwards of the British Museum. The only other two species of the genus are found in South America. My type, as several fresh specimens taken subsequent to the writing of the description show, is an undersized specimen, and the average length exceeds that given by one to two millimetres. One specimen has been placed at South Kensington.

Platyura tripunctata sp. nov.

Female.—Head : Frons yellow with short black pubescence, face concolorous, palpi brownish-grey. Antennae, scape and extreme base of first flagellar joint yellow, remainder brownish-grey.

Thorax : Yellow with black pubescence. Hind margin of mesonotum with three large, somewhat square-shaped black spots, from the middle one of which, the largest, precede three diverging black lines, barely reaching the fore margin, the middle one the faintest but proceeding the furthest Scutellum black. Pleurae yellowish, metapleuron with a dark bar. Metanotum blackish above and yellow below.

Abdomen : Dark yellow, hind margins of the segments narrowly darkened.

Legs : Pale yellow, tibiae and tarsi darkened.

Wings: Clear. Petiole of fourth vein about one-third the length of the fork. Halteres pale, capitellum slightly brownish.

Long: 2–2¼ mm.

Described from two females, both in good condition, taken on windows, Sudu-ganga, Matale, Ceylon, on May 24 and 26, 1922. Type and co-type in my own collection.

This species separates from *indistincta*, Brunetti, on the very distinct thoracic pattern.

ACNEMIA ASIATICA sp. nov.

Male.—Head: Yellowish, the frons thickly covered with black hairs. Face distinct. Antennae yellow, the bases of the flagellar joints increasingly blackened outwardly. Palpi with basal joints yellow, the two outer black. Eyes minutely pale pubescent.

Thorax: Dull yellow. From each shoulder a dark line converging medially before root of scutellum, each with a row of small but closely set bristly hairs. Shoulders and notopleural suture bristly. Pleurae concolorous. Spiracular area and mesopleuron blackened. Metapleuron with several longish bristles. Scutellum concolorous with mesonotum, marginally beset with numerous fine long bristles. Metanotum with sub-median rows of long bristles on lower half.

Abdomen: Seven distinct segments before the genital rings, elongate, black, dorsally with narrow yellowish junctions, which are rather broader laterally, the whole with short, thick hairs dorsally and ventrally. Genitalia prominent, blackish, hairy.

Legs: Anterior coxae black, hind pair yellowish except extreme tips, which are black. Femora yellow, tip of hind pair blackened. Tibiae and tarsi brown, the latter rather darker. Mid tibiae with only two rows of setulae apparent.

Wings: No sub-costal cross-vein. Yellowish. A dark costal patch between humeral cross-vein and tip of sub-costa, not descending behind vein I except in the marginal cell which is darkened from its transverse origin to a point just beyond the tip of the sub-costa. All apical third of wing darkened. Wing not as long as the abdomen. Halteres with yellow stem and very elongate blackened capitella.

Long: 6 mm.

Described from a unique male, legs damaged but otherwise in good condition, taken dead in cobweb, Pattipola Resthouse, Ceylon, 6,201 feet, on May 5, 1923. In my own collection.

Probably a new genus will be required for the reception of this species. The absence of the sub-costal cross-vein and the additional visible abdominal segment, making the relative wing-abdomen length shorter, are contrary to Johannsen's definition of Winnertsz' genus, but knowing that a revision of the Oriental *Mycetophilidæ* is in preparation by Mr. Edwards, I refrain from new generic erection meanwhile.

The bristly metanotum is a most exceptional character.

EXECHIA CRISTATOIDES sp. nov.

Male.—Head : Frons black, covered with somewhat widely separated silvery pubescence. A row of black supra-ocular bristles. Eyes minutely black pubescent. Antennae, scape and first flagellar joint yellow, remainder black with thick white pubescence, giving the whole a grey appearance.

Thorax : Dorsum dark brown with a yellow V-mark from the anterior margin to the base of the scutellum, the anterior margin itself very narrowly dark, with a T-form prolongation in the centre of the yellow V-mark for a short distance posteriorly. Scutellum and pleurae dark brown. Metanotum black. Edge of dorsum from wing roots round anterior margin with a row of bristles, the hindmost of which is very strong and long. V-mark edged with bristles as far as level of wing roots, behind which they become very weak and merge in the general microchaetae of the dorsum. The bristles of the V-mark are outwardly directed and decumbent, not forming a true crest. Humerus with three erect and two decumbent bristles, the three lowest the strongest. A very strong post-alar. Scutellar pair apical, divergent, erect. Metapleuron with about three weak bristles. All bristles black.

Abdomen : Strongly laterally compressed, black, bristly. Base of first segment and apex of sixth broadly pale yellow. the junction of the first and second very narrowly so. Third and fourth yellow ventrally, the colour extending half way up the sides. Genitalia yellow, very complex, each side-piece above with a long, bristly process.

Legs : Whitish, tips of hind femora slightly, and all tarsi darkened.

Wings : Smoky-grey, fork of fifth vein short. Halteres whitish-yellow.

Long : $2\frac{3}{4}$ mm.

Described from a unique male in perfect condition taken on a window, Sudu-ganga, Matale, Ceylon, on March 4, 1922. In my own collection.

Differs from *cristata*, S-W., by the absence of the posterior dark patch on the dorsum, the much paler legs, and the more shortly forked fifth vein. From my *paramirastoma*, with which it runs out in my key in *Mem. Dept. Agric. India*, Vol. VII., pp. 118–119, the thoracic V-mark and the pale halteres will at once distinguish it.

Delopsis Skuse.

In describing yet another new species of this genus it seems suitable to offer a key to the present muster of the Indian species, which have gone up considerably in number since the publication of the " Fauna " volume. (See Text Fig. 1.)

1.—Thorax all ferrugineous, or only slightly brown marked	.. ..	2
Thorax yellow with black markings	..	3
Thorax black, with or without touches of yellow laterally	.. ..	6
2.—Scutellum without golden pilosity		*setosiventris*, S.-W.
Scutellum with golden pilosity	..	*ferruginea* S.-W.
3.—A black saddle-mark on hinder half of meso-notum	.. .. ..	4
No such mark	.. .. ..	5
4.—Scutellum black	.. ..	*nigroflava* S.-W.
Scutellum yellow	.. ..	*brunettii* Edws.
5.—Meso-notum with anterior black spot continued posteriorly as a stripe ; sub-dorsal black stripes		*pectenipes*, S.-W.
Meso-notum with two black lunules,		*bilunulata*, sp. n.
6.—Sides of thorax grey	..	*griseolateralis*, Brun.
Fore margin and humeri yellow	..	*flavohirta*, S.-W.

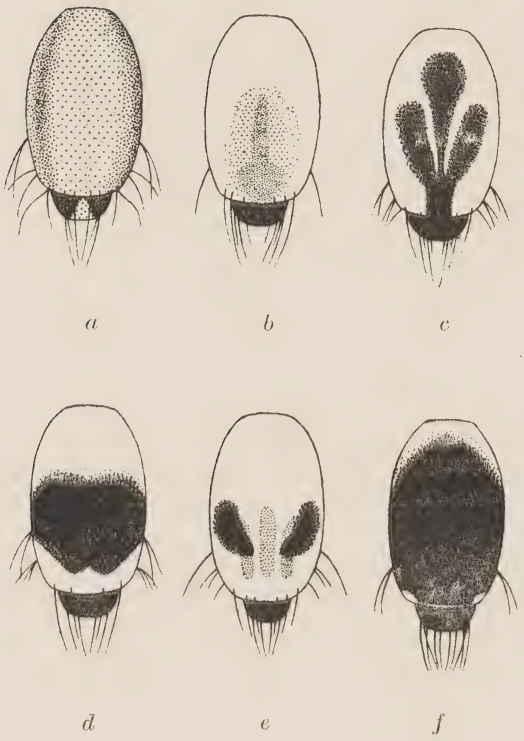

FIG. 1.—DELOPSIS spp.

(*a*) *ferruginea.* (*c*) *pectenipes.* (*e*) *bilunulata.*
(*b*) *setosiventris.* (*d*) *nigroflava.* (*f*) *flavohirta.*

DELOPSIS BILUNULATA sp. nov.

Male.—Head : Yellow. Antennae and palpi concolorous, the last ten joints of the former darkened, the amount of infuscation increasing apically.

Thorax : Dorsum and pleurae yellow, the former with short golden hairs, and, on posterior half, three obscure brownish stripes, over the outer of which on each side is a well-defined black lunule. Hypopleura and a small area below the wing roots blackened. Scutellum black. The usual six prescutellar and four scutellar bristles.

Abdomen : Yellow, the segments blackened apically dorsally, the infuscation covering all the first two, less than half the third and fourth and only the apical margin of the

fifth segment, and absent on sixth and seventh, which, with the small yellow genitalia are covered with short golden hairs. Just before the apex of the second segment on the mid-line of venter is a pair of decumbent bristles as in my *setosiventris*, which Mr. Edwards considers to be a generic character.

Legs : Whitish, apices of coxae slightly blackened. Hind tibiae with the usual three rows of setae.

Wings and veins yellowish, halteres pale whitish-yellow.

Long : $2\frac{3}{4}$ mm.

Described from a unique male in good condition, taken in garden, Sudu-ganga, Matale, Ceylon, on March 17, 1922. In my own collection.

Bibionidae.

SCATOPSE ZEYLANICA sp. nov.

(*Text Fig. 2.*)

Male.—Head : Shining black. Eyes closely approximated just above level of antennae, but more widely separated above and, viewed from in front, seemingly divided into two halves by the antennal plate. Antennae black, ten-jointed, with white pubescence, the tip of the second scapal joint appearing white. Palpi greyish.

Thorax : Black with short concolorous pubescence. Scutellum similar, the hairs longer.

Abdomen : All black, the genitalia small, concealed.

Legs : Femora and tibiæ black, tip of front tibiae and all tarsi yellow. The fore femora are only very slightly swollen, and the tibiae not clavate.

Wings : Clear. Fourth vein simple, fifth and sixth closely approximated, seventh distinct, bisinuate, and near its tip apparently with a re-curved appendix, which is very faint. Halteres black.

Long : $1\frac{1}{4}$ mm.

Described from a unique male in good condition, * taken on window in company with specimens of both sexes of *Scatopse brunnescens*, Brun., at Sudu-ganga, Matale, Ceylon, on July 17, 1922. In my own collection.

* Now headless.

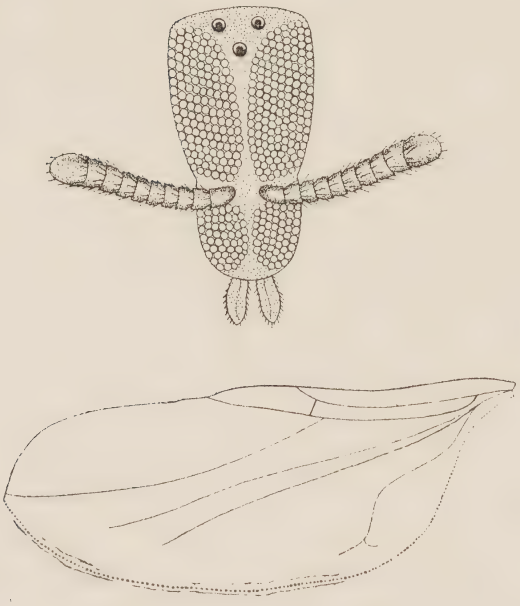

Fig. 2.—*Scatopse zeylanica*, head and wing

Unless a new genus be erected for it, this species will apparently have to remain as an unconformality in *Scatopse*. The ten jointed antennae and unarmed front tibiae prevent its inclusion in *Aspistes*, the only genus of the family with simple fourth vein.

It may be noted that the point of issue of the fourth vein, behind the basal section of the third, is against Brunetti's interpretation of the venation in this genus.

Dixidae.

Dixa zeylanica sp. nov.

Male.—Female.— Head : Vertex and frons pale grey-brown with some shimmering whitish pubescence. Face blackish with some pale pubescence. Proboscis dark brown, blackened basally. Palpi very dark brownish. Antennae, the first joint large, globular, bright ochreous-yellow, the flagellum very dark brown. Five joints can be distinguished, accounting for less than half the total length, of which the remainder is of an indefinite number of joints. Neck yellowish-brown above, darker below.

Thorax : Ground colour of dorsum pale brownish with whitish shimmer. A median stripe from neck to middle, orange-brown anteriorly, darkening to very dark brown posteriorly, and gradually broadening. Beyond the middle abruptly narrowed and continued to root of scutellum as a fine, black, not very distinct, median line. At sides of dorsum, commencing level with the broadest part of the median stripe, and continued to scutellum, a black stripe on each side, as broad as the broadest part of the median. The area between these stripes is grey-brown, darker than the ground colour in the anterior region. Pleurae yellowish-brown, with black irregular marks on the pro-, meso-, and ptero-pleurae, and with the major portion of the sterno- and meta-pleurae blackened. Scutellum black, with yellowish band beneath, remainder of meta-notum black. A fringe of strong, short hairs on the scutellar margin.

Abdomen : Black, with some sparse short hairs. Male genitalia very small, the claspers pale yellowish-white. Valves of ovipositor black.

Legs : Coxae yellow, the front pair blackened on the basal half. Femora yellowish-brown, the tips black, with a paler pre-apical ring. Anterior tibiae black with pale basal ring. Hind tibiae yellowish-brown, paler basally, and with apical shining black clavate area. Tarsi very dark brown, the base of the first joint paler.

Wings : In male clear, with yellow first vein ; in female greyish, with first vein dark. A more or less circular black patch centred over the fork of II. and III., not touching I., and with extension along anterior cross-vein. A dark stripe below vein I., before origin of II. A faint infuscation along the outer two-thirds of III. A circular black patch over middle of V. and an indefinite dark area in second basal cell above V. midway from the black patch to the fork of the vein. A fuscous suffusion over lower branch of V and in axillary region. In the much less maculate male wing only the prefurcal and fifth vein spots are visible, together with the suffusion over the lower branch of the latter. Halteres yellow.

Long : Male 2 mm. Female $3\frac{1}{4}$ mm.

Described from two of each sex bred from stream, Suduganga, Matale, Ceylon, during March, 1923. Types on March 26 to 28, 1923. All in my own collection. Additional specimens have since been bred from the same location.

Closely allied to *D. montana*, Brun., from which it differs *inter alia* by the much greater colour difference between the scape and flagellum, the black scutellum, and the wing pattern.

This is the first species of the genus to be described from India, south of the Himalaya, and again emphasises the close generic connection existing between the Ceylon Hills and that range.

The larvae are not seldom come across in mosquito survey work. They are black in colour, and move with the usual looping motion of the genus. They possess considerable powers of attaching themselves to the surface of the dipper, and even to the walls of glass tubes, and can wriggle clear of the water film up the sides of the breeding bowl. They usually pupate thus attached, but I have also, in the laboratory, found the pupae floating free in the water. This, however, is not apparently normal, and the tail is less recurved than in fixed pupae, and the mortality is higher. The capacity to attach itself to any surface, in larva and pupa, is doubtless an adaptation to life in hill torrents.

I have seen larvae, probably of the same species, in the Marlbe Valley in Kurunegala District at about 600 feet elevation. The streams in the Pattipola district (6,200 feet), swarm with the larvae of a species of this genus, but the colour is yellowish-brown, and I imagine that these represent another, and probably undescribed species. All that I collected were attacked by a fungus during transit to the low-country.

Tipulidae.

Geranomyia genitaloides sp. nov.

Female.—Head : Occiput pale whitish-grey, with a pair of large black spots nearly meeting in the middle behind, the vertical line consisting of a small grey diamond-shaped spot in front of neck, attached at the angle of its long side to a white line which gradually broadens to vertex. Sub-holoptic,

frons represented by a narrow whitish-grey line only. Proboscis very dark brownish-black. Palpi situate at half its length, very small, black. Antennae with the first scapal joint twice the second, greatly narrowed apically, and apparently flattened dorso-ventrally, so that viewed laterally the second scapal appears to be attached to a very narrow first joint; viewed from above the first scapal appears rather broader than the second. Flagellum normal, joints distinct.

Thorax: Ground colour of dorsum cinereous. A pair of median black stripes, fused anteriorly and reaching to neck, presuturally. They are broadest behind the humeral calli, and in this region show signs of being each divided by an indistinct paler line, so that almost four stripes seem to be present. Presuturally also there is a pair of broad sub-dorsal stripes above the noto-pleural suture, joined along the posthumeral depression to the median stripe. Post-sutural calli each with an irregular dark patch, the pubescence in the median area appearing brassy in certain lights. Pleurae yellowish-brown, grey dusted, especially the meta-pleuron. Scutellum dark brown, shining. Metanotum yellowish-grey dusted.

Abdomen: Dorsum very dark brown, venter more yellowish, Valves of ovipositor shining brownish-yellow.

Legs: (Front pair missing in type). Front legs all yellowish, posterior pairs, coxae yellowish-brown, remainder very dark brown, the femora noticeably and the tibae slightly yellowish, basally.

Wings: Clear, very iridescent, ground colour distinctly yellowish-grey, unmarked, save for pale brown stigma situate over marginal cross-vein. Venation exactly as described for *G. genitalis*, Brun. Veins brown, with short hairs. Halteres dark brownish, stems very thin and rather paler.

Long: (Without proboscis), 4½ mm.

Described from two females in good condition, except for the loss of the front legs in type, and middle legs in co-type, taken at Sudu-ganga, Matale, Ceylon, the type on scrub, at dusk, August 27, 1919, the co-type at flowers of *Mikania*, at dusk, February 4, 1920. Both in my own collection.

Amply distinct from *genitalis* and *nigronotata*, Brun. In the latter, of which I possess a dozen specimens from the same

locality as the present species, Brunetti makes no mention of the two patches of silvery shimmering pubescence on each side of the "dead black" spot before the wing base. I have hitherto refrained from describing this species in earlier parts of this series, in the hope of obtaining the male, but it is evidently very rare.

Limnobia albipes sp. nov.

Female.—Head: Occiput very dark grey, frons linear, whitish. Proboscis brown, palpi, and antennae blackish.

Thorax: Brownish-yellow, dorsum unmarked. Post-sutural calli very slightly darker. Pleurae with broad dark stripe reaching from neck to base of abdomen, above this, concolorous with dorsum, below, paler whitish-yellow. Scutellum very dark brown, metanotum rather paler.

Abdomen: Black. Eighth and ninth segments and the valves yellow, as also sometimes an indefinite median area on second and third segments. Venter with apices of fifth, sixth, and seventh, and all the eighth yellow. Bases of valves ventrally black.

Legs: Coxae and base of femora pale yellowish, remainder of femora and basal three-quarters of tibiae brown. Apical quarter of tibiae and first four tarsal joints dirty-white. Fifth tarsal joint darkened, sometimes hardly noticeably.

Wings: Dark grey, highly iridescent, unmarked, stigma barely noticeable on close examination. Auxiliary vein ending just before the origin of the third vein. Sub-costal cross-vein present. Second vein commencing in mid wing, the distance along first vein from its origin to tip of auxiliary approximately equal to distance thence to the tip of the first vein. Prefurca three-fifths the length of the rest of the second vein. Basal part of third thrice the length of the anterior cross-vein, situate at upper basal angle of discal cell, which is approximately quadrangular, twice as long as broad, and about as long as the third posterior cell. Posterior cross-vein just before or beyond the lower basal angle of the discal cell. Halteres with black stem and brown capitella, translucent.

Long: 4½ mm.

Described from three females, all taken on windows, Sudu-ganga, Matale, Ceylon, on August 22, 1919, November 12, 1919 (type), and January 12, 1920. All in my own collection.

At once separable from *niveipes*, Brun., on the white metatarsi.

Orimarga asignata sp. nov.

Male.—Head: Back of head brownish, lateral post-ocular region greyish. Frons wide, brownish-grey, face yellowish-brown. Proboscis concolorous, rather darker apically. Palpi very dark brown. Antennae very dark brown throughout, the first scapal joint twice the second and much narrower.

Thorax: Brownish-yellow, the median post-sutural area paler, unmarked, with a little fine grey pollinosity. Pleurae yellow, concolorous with the pale area of the mesonotum, as is also the scutellum and metanotum.

Abdomen: Brownish-yellow, laterally unmarked. Genitalia concolorous, without stiff black hairs below.

Legs: Pale brownish, coxae and bases of femora rather paler yellowish.

Wings: Clear. Venation exactly as described (but not figured), for *peregrina*, Brunetti, Halteres pale yellowish-brown.

Length: 4½–5 mm.

Described from three paratype males, none in perfect condition, all taken at Sudu-ganga, Matale, Ceylon, one "at light" on October 24, 1919, the others in garden on November 18, 1919, and January 4, 1920. All in my own collection.

Differs from *peregrina* by the unmarked thorax. The genitalia appear different, but little reliance can be placed on descriptions of the undissected organ.

Styringomyia marmorata sp. nov.

Male.—Head: Depressed. Back of head and frons dull greyish-brown. A pair of strong post-verticals and about

three pairs of irregularly placed strong frontals, all proclinate. A post-ocular row of much weaker bristly hairs. All bristles black. Face and proboscis dark brownish, the former with some bristles, palpi concolorous, with the basal half of third and all fourth joint, except extreme tip, whitish. Antennae, scape dark brown, first joint cylindrical, twice the second, which is pyriform, the narrow end inmost. Flagellum brownish-white. First scapal with an apical above, second scapal with many more median bristles, flagellar joints each with a basal verticil of several long black bristles.

Thorax : Collar and humeri yellowish-white. Mesonotum velvety-black, with a U-shaped pale yellowish-white mark presuturally, and the inter-callary post-sutural area pale. Pleurae brownish, sternopleuron yellowish-white. Scutellum black, lateral lobes pale, forming part of post-sutural pale area of meso-notum. Metanotum black. From each of the anterior angles of the thorax a pair of strong black bristles projects forward over the head. The humeri each bear a pair of strong, anteriorly directed bristles. The mesonotum has a sub-dorsal row of black bristles which, just before the anterior end of the pale U-mark, are approximated into a regular crest of black, spiny bristles, all slightly reclinate. The rows continue to the inner angles of the U-mark.

There is a strong upright black bristle on the inner margin of each post-sutural callus, two or three very strong supra-alars, outwardly and laterally directed, and the scutellum bears a pair of upright, lightly crossed apicals.

Abdomen : Black, the apices of the segments very narrowly pale. The first six segments bear an indefinite median pale yellowish-white band, much more definite on the last of those, but broadly interrupted dorsally. Seventh segment laterally compressed, blackened dorsally, with big yellowish lateral patches. Venter mottled, dirty whitish-yellow and black, no pattern. Genitalia swollen, large and complex, rather concealed.

Legs : Coxae dark brown, front pair pale apically. Front trochanters pale, posterior pairs dark. Front femora pale, clavate, with three dark rings, of which the first covers the

apical half of the shaft, the second most of the basal half of the clavate area, whilst the third, half the breadth of the two others, is sub-apical. Tibiae whitish, with narrow black rings at one-third and apically. Tarsi with tip of first and all fifth joint black, otherwise white. Middle legs similar to front, but the dark ring on the shaft of the femora evanescent. Hind legs, femora less clavate than the anterior pairs, with sub-median and apical broad black rings, tibiae and tarsi as anterior pairs.

Wings : Pale grey. Sub-costal vein ending opposite the origin of II., the cross-vein at its tip. II simple, III. running straight to margin. Anterior cross-vein joining III to discal cell. Second posterior cell petiolate. Posterior cross-vein nearly at middle of discal cell. VII abruptly turned down before tip. Costal, first and prefurcal veins yellow, except the two latter where they pass through the dark areas, other veins dark. Wings marked as follows :—A dark mark below humeral cross-vein, a grey patch in both basals before the origin of the prefurca, a grey band from in front of tip of sub-costal across middle of both basals to VI. A broader, and anteriorly much darker, band from II over anterior cross-vein, base of discal cell, dividing in second basal, the outer branch running over posterior cross-vein to tip of VI, the inner at one-third the distance to VII. There are several pale spots in this band. Sub-costal cell with a median and pre-apical dark markings, the former large and including a small clear costal spot. The posterior and anal cells contain a maculation of grey spots centered over the petiole of the second posterior.

Halteres pale yellowish, tip of stem brownish.

Long : 7 mm.

Described from a unique male in fair condition taken at Sudu-ganga, Matale, Ceylon, on March 18, 1922, flying in garden at dusk.

The species bears a superficial resemblance in wing and leg coloration to *G. cyanea*, but altogether lacks the violaceous body colour of the latter. The remarkable development of bristles is unlike anything else known to me in *Limnobiinae*.

Leptidae.

RHACHICERUS ATERRIMUS sp. nov.

Male.—Head: Frons and face shining black, the former longitudinally striated, the latter with a patch of greyish pubescence at level of antennae laterally, invisible viewed from below. Proboscis and palpi black. Antennae black, 2 + 15 jointed, of which the first fourteen flagellars have the usual decumbent finger-like processes, each of which is nearly as broad as the main joint is long, and the median ones are nearly half as long as the whole flagellum. Terminal joint simple, shorter than the process of the penultimate, lightly bisinuate and incrassate on basal two-thirds, with a preapical bristle in the curve of the upper bend.

Thorax: Shining black, the shoulders blackish-yellow obscurely.

Abdomen: Shining black, pubescent.

Legs: Black, femora and tibiae with thick, short whitish hairs. Base of hind femora, anterior knees, and first two or three tarsal joints whitish, the tips of the latter blackened, especially the hind metatarsus.

Wings: Grey, slightly darker along fore border, with a large, undefined stigmatic darkening. Venation exactly as in *unicinctus*, Brun. Halteres white with stem brownish.

Long: (Without antennae), 6 mm.

Described from a unique male in perfect condition, taken on a flowering tree at edge of forest, Pattipola, Ceylon, 6,200 feet, on May 5, 1923. In my own collection.

Amply distinct from the other described Oriental species.

Tabanidae.

TABANUS ANGUSTILIMBATUS sp. nov.

Female.—Head: Frons in length ten times its width at vertex, cinereous, with a yellowish-brown tinge above, and narrowed anteriorly by a full half. Callus fusiform, touching the eyes, its extension broadening slightly above and reaching

nearly to three-quarters the distance to vertex. Face grey, beard whitish. Antennae, first joint black, with apical black pubescence, with a whitish-grey patch basally above; second joint small and black; third joint with the first annulation very dark brown, with prominent tooth, the remaining annulations black. Palpi pale lilac-grey, apical half more yellowish-grey, the outer two-thirds with rather stiff black hairs, the tips exteriorly appearing almost black. Proboscis black.

Thorax: Dorsum dark slate-grey with only the barest traces of paler stripes, such pubescence as is present, black, except for some brassy-white hairs before the concolorous scutellum, and in the lateral fossae. Lateral hairs black. Pleurae paler grey, with thick white hairs.

Abdomen: Very dark brownish-black, except the first joint, dark greyish, and second, dark brown. Second to sixth segments narrowly margined yellowish-white posteriorly, and also the lateral margins on the third to fifth segments.

Venter similar.

Legs: Coxae grey, slightly darker than the pleurae. Femora black, with traces of yellowish knee-spots. Front tibiae with basal third pale brownish with white hairs, remainder black; posterior pairs yellowish with apical fifth black.

Posterior femora and tibiae with white hairs. All tarsi black.

Wings: Clear, stigma pale brownish-yellow. Vein III. without appendix to the upper branch. Halteres with stem and capitella brownish-white above.

Long: 13 mm.

Described from a perfect specimen taken at light, Kepitigalla, North-Western Province, Ceylon, on March 16, 1923. In my own collection.

A second specimen in rather rubbed condition, also taken at light at Marlbe (about three miles distant from the type locality and about 600 feet lower elevation), on March 8, 1921, has the first two antennal joints yellow, except the tip of the first above, which is black, and the posterior femora distinctly yellow-brown on the underside. The pale yellowish lateral margins to abdominal segments five to seven are also much more distinct.

The species runs out at couplet 60 of Miss Ricardo's table of the Indian species. It is, however, a smaller species than either the Nicobar or Bornean species running to the same couplet, and separates from them on the clear wings and not all-black legs.

Tabanus demellonis sp. nov.

Female.—Head: Frons six to seven times as long as its width anteriorly, where it is hardly narrowed, dull ashy-yellow. Frontal callus brown, pyriform, not touching the eyes and with fairly stout extension to three-quarters the distance to vertex. Face concolorous with frons. Subcallus pollinose and not distinguished, with a few weak, sparse hairs below of a darker shade. Palpi rather more greyish cinereous, covered on the outer side with short black hairs from base to tip, on inner side pale fawn-grey without any black hairs. Cheeks almost bare, such hairs as there are, concolorous with facials. Antennae, first joint yellowish-grey with black hairs; second with very strong teeth, clearer yellow, with black hairs; third with basal annulation deep orange, the teeth weak and flattened, and apical annulations deep black.

Thorax: Mouse-brown, calli more ashy-yellowish, with traces of four darker stripes. Pubescence very sparse, black and whitish-yellow intermingled. Pleurae yellowish-ashy, with very few pale hairs. Scutellum concolorous with darker part of mesonotum.

Abdomen: Orange-brown, unmarked, darkened on the last four joints or so. Venter similar.

Legs: Yellowish-brown, coxae more greyish. Apical half of front tibiae and the front tarsi blackened, as are the apices of the posterior tarsi slightly.

Wings: Grey, a darker stripe along costal margin from stigma to apex, not sharply defined behind; costal cell dark yellow. There are paler hyaline streaks in all cells from the sub-marginal to the fifth posterior, but not in the basals and discal. Fork of vein III. without appendix. Halteres with stem brown and capitellum more yellowish.

Long: 11 mm.

Described from a unique female in good condition taken on carriage horse, Combarjua, Portuguese India, on June 13, 1920, by Major Froilano de Mello, Director of the Bacteriological Institute of Nova Gôa, in whose honour I have much pleasure in naming it. In my own collection.

In Miss Ricardo's table of Indian species falls into Group X., running out with *diversifrons*, Ric., and separating on the yellowish legs.

Bombyliidae.

Exoprosopa Affinissima sp. nov.

(*Text Fig. 3.*)

Female.—Head: Frons at widest barely one-third of head, yellowish-grey at vertex and on two spots contiguous to the eyes above antennae, remainder black with black hairs and a sparse scattering of greyish scales. Antennae with first two joints black, third dark brown. Face brown, with black hairs and greyish scales, with a narrow, curved, naked, pale greyish patch below each antenna laterally. Occiput grey with black hairs and a narrow post-ocular fringe of pale scales. Proboscis black.

Thorax: Black with black scales. Collar of dull golden scales, and a few brown scales above wing roots. Scutellum concolorous, with about eight strong apical bristles. Pleurae black, a fan of brown hairs on humeral calli and a few below wing roots. Squamae with greyish scales.

Abdomen: Black, anterior corners of first segment with a tuft of white hairs, a few white scales at anterior corners of second segment, the remainder of the margins of which are brown, third segment with anterior corners with white scales and a lateral tuft of shorter white and longer black hairs, sixth segment with outer third of dorsum on each side white-scaled anteriorly, seventh with a few white scales at anterior corners. Venter brownish, with scattered pale scales.

Legs: Black, fore femora and tibiae brown, darkened at tips and bases, and mid femora slightly brownish on basal half. Posterior femora and tibiae bristly.

Wings: Hyaline, with a black band reaching from just before tip of first vein to middle of second posterior cell, covering all of wing to base except a clear area extending from middle of third posterior cell over outer half of discal and running to margin just behind tip of sixth vein. A pale spot at fork of second and third veins, at fork of fourth (hyaline), over basal section of upper branch of fifth vein, and across base of basal cells. Halteres black with yellowish-white capitellum.

Long: Body 10 mm., wing 11 mm.

Described from a unique female in good condition taken in bungalow, Sudu-ganga, Matale, Ceylon, on February 19, 1922, exploring dark corners. In my own collection.

This species is undoubtedly very closely allied to *Exoprosopa lar*, Fb., but is, I think, sufficiently differentiated in the following points to justify its description as new. The frons is nearly half as wide at vertex as at root of antennae, and has no pink or orange tint. The frontal and facial pale areas are not found in *lar*. The first two antennal joints are black, not ferrugineous. The thorax is practically without coloured scales on the disc. The humeral hair-like scales are much darker than those of the fore margin of the thorax. The pleurae are also almost entirely without coloured scales, and the posterior calli are not colour differentiated. The scutellum is black, not reddish-brown. Only the second abdominal segment has any trace of reddish, and the white scales on every segment are much less in extent than in *lar*. The legs are darker. In regard to the wing pattern the colour of the open parts is clear hyaline, not greyish, and the band is black, not dark brown. It reaches the posterior margin beyond the median clear area, which it does not do in *lar*, Brunetti's re-description of which states that the extent of the brown coloration is "only very slightly variable." The halteres have a pale, not black, capitellum. The species is much smaller, only 10 mm., as against 14–16 mm for *lar*.

Mr. Brunetti informs me that the specimens referred to, by him, in his re-description of *lar* in the "Fauna" taken by Col. Yerbury at Mahagany, in the Trincomalee District, which

represent apparently a different species, are in too bad order to use on the points of difference noted for the present species. He also informs me that there is in the British Museum a specimen from the same place, passed by him as true *lar*, in which the apical half of the band reaches the hind margin in the outer half of the third posterior cell only, being greatly narrowed from about the fork of the third vein.

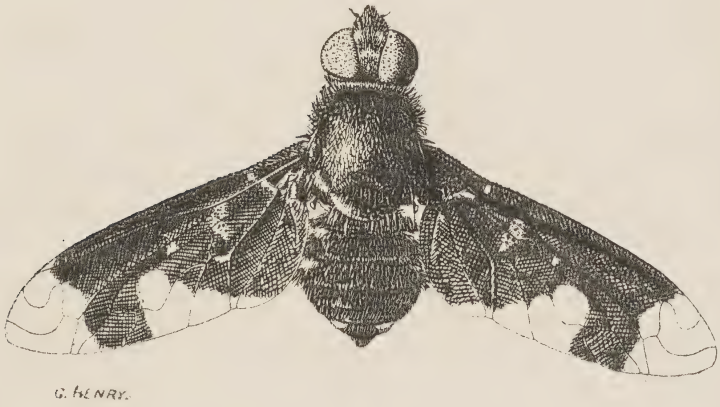

FIG. 3.—*Exoprosopa affinissima.*

Empidae.

ACARTERUS VARIPES sp. nov.

Female.—Head : Upper half of eyes bearing large facets, flattened as compared with the lower half bearing small facets. Proboscis yellow, palpi brown, not very small. Antennae very dark brown, with long arista. Occiput dark greyish.

Thorax : Somewhat shining black, with some sparse brassy pollen, only visible when viewed laterally. Some lateral and a row of dorso-central bristles on posterior side of hump. Scutellum concolorous, with marginal hairs.

Abdomen : Dull black, with some short hairs. Venter not noticeably paler.

Legs : All coxae black, anterior femora and tibiae brown, yellow apically, and at base of tibiae, tarsi yellow. The darkening of the femora and tibiae is much more apparent on front than on mid pair. Hind femora black, some long hairs below. Hind tibiae dark brown, with yellow basal and apical broad rings. Hind tarsi yellow, basal two-thirds of first and all fifth joint dark brown.

Wing : Pale brownish. Anal cell only very slightly longer at lower corner than second basal. Halteres large, black.

Long : $2\frac{1}{2}$ mm.

Described from a unique female, in fair condition, taken at Sudu-ganga, Matale, Ceylon, on July 4, 1919, hovering round scrub along river bank. In my own collection.

Amply distinct from the other two known Indian species by the all-black hind femora.

Syneches jardinei sp. nov.

Female.—Head : Upper eye facets reddish-brown, lower dark brown. Occiput and vertex black. Frons very small, black, shining. Face narrow, dull black. Proboscis brownish-yellow, approximately as long as height of head, directed forwards and downwards. Palpi darker brown, moderately long. Antennae greyish-brown, third joint twice the second, with apical black arista as long as the whole antennae.

Thorax : Strongly humped, black. Some long pre-alars and two dorso-centrals on hinder slope. Scutellum shining, appearing yellowish through thick, dull brassy pollen.

Abdomen : Dull black, with lateral pale hairs.

Legs : Coxae brown, grey pollinose. Anterior legs yellow, front tibiae somewhat darkened, also fifth tarsal joint. Hind femora black, except for extreme base and apical quarter. Hind tibiae brownish basally, remainder and tarsi black. The fifth tarsal joint in all pairs incrassate. Tibiae with long bristles, all legs with softer hairs and pubescence in addition. Hind femora with a single range of strong bristly spines antero-inferiorly, near tip with one or two post-inferiorly. Near the middle the spines as long as width of the incrassated femur, those near the ends of the row shortened.

Wings: Clear brown, the area between veins I. and II. darker. Second basal appearing longer than the anal by reason of the very oblique fork of IV. Halteres black, base of stem yellowish-brown.

Long: 5 mm.

Described from a unique female in good condition taken at St. Vigean's, Bogawantalawa, 4,800 feet, on April 12, 1920, by Mr. N. K. Jardine, of the Entomological Division, Department of Agriculture, Ceylon, after whom I have much pleasure in naming it. In my own collection.

In Brunetti's table of *Syneches* (*sens. lat.*) in the "Fauna" runs to couplet five and there separates on the colour difference between the anterior and hind femora.

SYNECHES PERADENIYAE sp. nov.

Female.—Head: Eyes practically contiguous below and absolutely so above antennae, upper facets reddish-brown and much larger than lower, but the colour difference not so marked as usual. Proboscis brownish-yellow, as long as the height of head, obliquely forward directed. Palpi very thin about as long as third antennal joint, with an apical and submedian black bristle on lower side, each rather longer than a palpus. Antennae, first and second joints greyish-brown, third fulvous yellow, with sub-basal black bristle above. Style two and a half times as long as antennae, basally pale yellow, remainder black.

Thorax: Dull black, some strongish bristles on hinder slope. No fine hairs. Scutellum slightly more brownish, with long hairs intermixed with bristles marginally.

Abdomen: Dull black, some lateral hairs. No golden hairs on fifth sternite. Genital lamellae elongate.

Legs: Coxae black, femora and tibiae very dark brown. Front tarsi concolorous or only slightly paler. Posterior tarsi brownish-yellow, fifth joint incrassate, darkened, especially on hind legs. Hind femora basally incrassate, about five weak bristles below in anterior row and two or three in posterior row sub-apically.

Wings : Clear, veins yellowish. An indefinite faint stigmatic yellowing at tip of marginal cell. First posterior cell, though its bounding veins run parallel apically, distinctly narrower there than above inner half of last section of IV. Anterior cross-vein at one-fifth of discal cell. Second basal and anal cells sub-equal. Halteres dark brown, capitella large, stem rather more yellowish-brown.

Long : $3\frac{1}{2}$ mm.

Described from a unique female in good condition taken in Royal Botanic Gardens, Peradeniya, Ceylon, on May 23, 1920. In my own collection.

There may be some doubt as to whether this species falls into *Syneches* or *Acarterus*. In favour of the former genus is the rather more elongate third antennal joint. In Brunetti's key it runs to *palliditarsis*, Brun., separating on the paler third antennal joint, the absence of golden hairs on the fifth sternite of the female, and the darker tibiae, and the clear wings without noticeable stigma.

It may be noticed that the relative lengths of *palliditarsis* and *fuscipennis* are transposed in the "Fauna" key (presuming that the correct lengths are those given in the descriptions), in which case the present species is smaller than *palliditarsis*. From *fuscipennis* the dark hind femora at once separates it.

SYNECHES MACULITHORAX sp. nov.

Male.—Female.—Head : Eyes absolutely contiguous in both sexes above, face narrow, dark yellow. Proboscis longer than the height of the head, brownish-grey. Palpi brown, extremely short and narrow, with a long apical bristle extending to two-thirds the length of the proboscis. Antennae orange-yellow, the sub-apical style black and twice the length of the joints.

Thorax : Viewed from above blackish, with brown patches on the median area subdorsally, the position varying with the light incidence. It usually appears as if there are black median and lateral stripes on a brown ground. Some strong bristles on the posterior slope and on the dark brown scutellum marginally. The mesonotal pattern is best seen from in front or from the side and above.

Abdomen: Dark brownish-black, rather well haired, especially towards base in male, the hairs rather paler. Genitalia in male small, concolorous; in female elongate, concolorous.

Legs: Coxae, femora and hind tibiae clear brown, anterior tibiae and all first four tarsal joints brownish-yellow, last tarsal joints black, incrassate. Hind tarsus with some golden pubescence, and slightly darker than the anterior pairs. Hind femora with about six long bristles below in anterior row, posterior row of very short spines intermingled with equally short hairs. Posterior femora and all tibiae with hairs as well as regular bristles.

Wings: Brown, stigma elongate, much darker. First posterior cell slightly broader at middle of last section of IV than before and beyond this point, but not at all narrowed. Second basal and anal cells sub-equal. Basal section of IV very weak. Halteres yellow-brown.

Long: $3\frac{1}{2}$–4 mm.

Described from nine specimens of both sexes, taken on roadside, Habarane, North-Central Province, Ceylon. November 14 to 15, 1918. In my own collection. The species was common on low herbage in company with a small Asilid of the genus *Atomosia*.

In connection with the foregoing described species, Brunetti's table on pages 326 and 327 of the "Fauna" volume may be re-cast as follows:—

10.—Wings distinctly brownish	..	.. 11
Wings clear	..	.. *peradeniyae* nov.
11.—Long: 5 mm., first posterior cell distinctly narrowed apically. Fifth sternite with golden hairs in ♀	..	.. *palliditarsis*, Brun.
Long $3\frac{1}{2}$ mm., first posterior cell not narrowed. Fifth sternite without golden hairs in ♀	..	.. 12
12.—Third antennal joint brown. Femora black	..	*fuscipennis* Brun.
Third antennal joint orange. Femora brown	..	*maculithorax* nov.

TACHYDROMIA MONTICOLA sp. nov.

Female.—Head : Black, occiput with some greyish shimmer. Clypeal margin yellow, proboscis black. Antennae black, style, except extreme base, yellowish-white. Proboscis three-quarters the height of the head in length.

Thorax : Shining black with dull yellow pollen. Scutellum similar. A pre-alar bristle.

Abdomen : Shining black, no pollen.

Legs : Very dark brownish-black, fore trochanters and extreme tip of coxae yellowish.

Wings : Grey, anal vein very weak interior to junction of lower branch of V. Anterior cross vein joining upper end of posterior (being thus at extreme tip of discal cell), the posterior cross vein oblique. First posterior cell narrowed apically, but the branches ultimately parallel. Halteres dull greyish.

Long : $2\frac{1}{2}$ mm.

Described from a female in good condition, taken on flowering trees at edge of forest, Pattipola, Ceylon, 6,200 feet, May 5, 1923. In my own collection.

A second specimen, also a female, same place and date, has the fore coxae all pale and the mid femora reddish-brown. In this specimen the palpi are visible and are short, pale, flattened. Whether this specimen represents another species, or, more likely, a paler, possibly immature form, the material is too scanty to decide.

The present species differs from *gentilis*, Brun. by the black legs, and from *orientalis* Brun. by the all black antennae.

Phoridae.

APHIOCHAETA PSEUDOSCALARIS sp. nov.

Female.—Frons yellow, with very fine black pubescence. Ocellar triangle not obvious, the upper ocelli dividing the vertex into three equal parts. All cephalic bristles black.

The two upper frontal rows of four each, reclinate, the inner pair of second row slightly but distinctly *lower* than the outer pair. A post-vertical pair of convergent small bristles contiguous to the outer pair of upper frontals. Third row of frontals with the outer bristle as much below the second row as this is below the first, below which there is what is probably the inner bristle of the third row, situate slightly more medially than the outer bristle, and both reclinate. Fourth row proclinate, the outer bristle twice as distant inwardly from the lower bristle of the third row as this is from eye margin, and half as far below it as the latter is below its outer bristle. The inner pair of the fourth row are still lower and close together on mid line. The third and fourth rows form a semi-circle. Face orange-yellow. A post-ocular row of small bristles, *four* strong bristles at lower edge of eye, and a much weaker row on lower edge of face. Eyes minutely pale pubescent. Antennae pale yellowish, arista *bare*, the basal joint yellow, the apical black. Palpi pale yellowish, with several strong bristles.

Thorax: Yellow, dorsum with closely set black setulae, unmarked. Scutellum paler yellow, with only two strong bristles, closely exterior to which are a pair of minute bristles, hardly stronger than the thoracic setulae. Pleurae bare.

Abdomen: Dull yellow, probably variable in appearance. in the type the sides of the dorsal surface of the first, third, and fourth segments are blackened, and there is a lateral spot on the fifth segment. Venter brighter yellow.

Legs: Pale, with dark setulae. Tips of hind femora and tibiæ blackened. Hind tibiae strongly bristled on inner side.

Wings: With veins paler and less distinct than in *scalaris*, the third vein ending slightly beyond the middle of the wing, and with the fork more widely open than in the latter species. Halteres yellow, the stem slightly darkened.

Long: $2\frac{1}{4}$ mm.

Described from a unique female in good condition, taken at Banhar, North Bihar, October 8, 1921, by Mr. H. A. Inglis. Type in my own collection.

The chief points of difference from *scalaris* are the two-bristled scutellum and the four strong infra-ocular bristles, but when the two species are placed side by side they appear amply distinct in facies.

Aphiochaeta achatinae sp. nov.

Female.—Head: Frons and face greyish-yellow with minute scattered black hairs.

Ocellar triangle and frontal groove distinct. Bristles black, verticals and ocellars strong, erect, divergent; at one-third of frons a row of four reclinate frontals all on one level, below, a curved row of six, of which the outer pair is at half the length of the frons, the middle and inmost pairs at two-thirds, the two outer reclinate, the latter alone proclinate. Antennae pale orange, flagellum, except base, black, microscopically pubescent. Palpi whitish with black bristles. At lower corner of eye three strong bristles, two anteriorly and one posteriorly downward directed.

Thorax: Yellow-brown with short black pubescence, unmarked, scutellum concolorous, with a strong apical and weak sub-apical pair of bristles. Pleurae concolorous, without pubescence.

Abdomen: Orange, unmarked. Second segment with short lateral bristles, and sixth with some irregularly placed ones on dorsum. Seventh segment narrow, whitish, the stout, bristly ovipositor black.

Legs: Whitish, mid coxae with a diamond-shaped black streak on posterior side.

Wings: Distinctly yellowish, exterior veins curved, the second and third markedly bisinuate. Halteres pale yellowish orange.

Long: 2 mm.

Described from a unique female in good condition taken on dead *Achatina* snail, Sudu-ganga, Matale, Ceylon, July 13, 1922. In my own collection.

The two above described species both run out with *latifasciata* in Brunetti's table of the Indian species. They will separate as follows :—

1.—Three rows of frontals distinct, abdomen black marked laterally 2
Second and third rows of frontals forming a single curved row, abdomen unicolorous .. *achatinae*, nov.

2.—Third frontal row all reclinate, a subsidiary proclinate fourth row .. .. *latifasciata*. Brun
Third row all proclinate .. *pseudo-scalaris*, nov.

PULICIPHORA TRISCLERITA sp. nov.

(*Text Fig. 4.*)

Female.—Head : Dark brown. A post-ocular, two upper reclinate and a lower pair of proclinate frontals. Antennae yellow, pyriform, the long style very minutely pubescent, thickened basally. Palpi yellow with black bristles.

Thorax : Short, no longer than head, dark brown. A row of bristles on hind margin.

Abdomen : About five times as long as head and thorax together, enormous in comparison therewith, ovate. The first four tergites strongly chitinized, nearly black, those of the first two segments fused and twice as long as the third or fourth. Remainder of dorsum and venter pale yellow, membranous. The whole with pale pubescence.

Legs : Long, yellowish-brown. Front femora with a deep groove beneath throughout their length. Hind metatarsus incrassate, and with a black chitinized ridge on front margin which, displaced backwards laterally, runs over the next three joints, being apparently absent from the fifth.

Long : 1 mm.

Described from seven females out of a swarm bred in a decaying snail, *Achatina fulica*, at Sudu-ganga, Matale, Ceylon, on July 19, 1922. Type in my own collection.

The male is unknown.

The generic definition demands four chitinized abdominal tergites. In this species there appear to be only three, owing to the fusion of the first two.

FIG. 4.—*Puliciphora trisclerita.*

Sepsidae.

SEPSIS INGLISI sp. nov.

(*Text Fig. 5.*)

Male.—Female. Head: Black, antennae brownish-yellow. The additional frontal bristle very minute, but present.

Thorax: Black, with an aeneous tinge. Sternopleuron white-dusted above only.

Abdomen: Black, with a purple tinge. The large male genitalia have the tip of the superior claspers furcate.

Legs: Fore pair yellow, except the last four tarsal joints, femora with two black ligulate spines on inner face below, the anterior much the broader, tibiae with a notch on inner edge before half length. Posterior legs black, the coxae and base of femora yellow, without conspicuous bristles. Front legs simple in female.

Wings: Clear. Halteres with dark stem and white capitellum.

Long: $3\frac{1}{2}$ mm.

Described from twelve males and five females, all taken by Mr. H. A. Inglis, after whom I have much pleasure in naming it, at Banhar, North Bihar, in July and August of 1921 and 1922. Type, allotype, and co-types in my own collection, co-type of each sex in Inglis's collection.

Very similar in appearance to *S. fasciculata* Brun., but separable in both sexes by the much weaker additional frontal bristle, and in the male by the very different genitalia and the different construction of the fore legs.

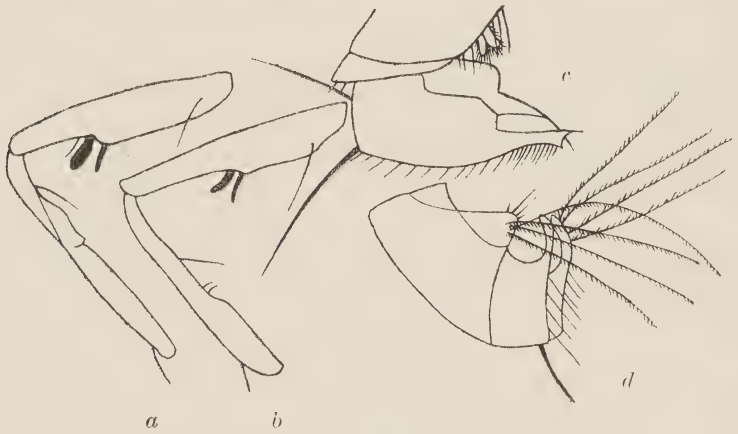

FIG. 5.—*a*, *c*, *Sepsis inglisi* sp. nov. *b*, *d*, *Sepsis fasciculata* Brun.

Sapromyzidae.

LONCHAEA BICOLORICORNIS sp. nov.

Male.—Female.—Head: Frons black, in female one-third the width of head, rather less than this in the male. Parafrontalia at vertex one-third of this width each, running more or less parallel to the orbits to slightly below the lower corner of the ocellar triangle, from whence the margins are sharply angled outwards to touch the orbits at three-quarters the distance from the vertex. Parafrontalia shining, frontalia dull black, with a distinct separating ridge between, the whole with longish, scattered pubescence. Verticals 1 : 2, the inner small, the two outer pairs long; ocellar pair long, porrect; orbitals 1, large, erect, situate slightly below the lower corner of the ocellar triangle. All bristles black. Face dull black, parafacialia and genae dull grey shimmering. A distinct median paler grey facial stripe; epistomal margin above outlined ochreous, pre-labrum somewhat prominent, black. Antennae longer than the face, very broad from back to front, dark brownish, the extreme base and hinder edge except at tip yellow, as are the small basal joints, the second of which

bears a thin black bristle. Arista bare, the basal third yellowish, remainder black. Palpi phylliform, yellow. Proboscis black.

Thorax: Shining black, in some lights with a steel-blue tinge. Chætotaxy: a humeral, 2 notopleural, 3 supra-alar, 1 acrostichal and 2 dorso-central, 4 scutellar, the apicals parallel, 5 marginals on mesopleuron posteriorly, one sterno-pleural. The whole thorax with fairly long pubescence except on scutellum, where it is confined to the margins, sparsely. All bristles and pubescence black.

Abdomen: Black with steel-blue reflections. Male hypopygium inconspicuous; ovipositor small, yellowish.

Legs: Femora and tibiae black with steel-blue reflections, tarsi with first three joints yellow, the two apical black.

Wings: Hyaline, foreborder yellowish, especially towards base. Veins yellow, the fourth slightly upturned in the margin. Halteres black.

Long: 5 mm.

Described from a male and two females, none in perfect condition, bred from *Excaecharia agallocha*, Sunderbans, Bengal (C. Beeson), between January 24 and March 14, 1921. Type male and female in Forest Entomologist's collection, Dehra Dun, co-type female in my own collection.

Separates from *L. megacera*, Kert., on the yellow second and third tarsal joints.

Muscidae.

GRAPHOMYIA LUTEICORNIS sp. nov.

Female.—Head: Frons one-quarter head width; frontal stripe black, somewhat narrowed anteriorly, parafrontalia dull silvery, narrow. Face silvery, with a strong median carina, yellowish shining, produced into a knob at level of first third of third antennal joint. Antennae pale dull yellow, not quite reaching to level of lower corner of eye, arista concolorous, with long black rays. Palpi rather brighter yellow, apically sub-clavate, proboscis very dark brown to yellowish. Eyes bare.

Thorax: Pale ashy-grey, with two pairs of narrow blackish stripes, the interior commencing halfway between suture and

root of scutellum, and running straight and uninterruptedly to front margin, very slightly converging; the outer commencing posterior to the inner, but stopping before the suture in front of which they are only represented by a pair of elongate, triangular spots. Presuturally both pairs of stripes may be yellowish-brown.

Pleurae yellow, thickly grey dusted. Scutellum brownish-yellow.

Chætotaxy: Acrostichals only a weak prescutellar pair. Dorso-centrals 2 : 4. Humerals 3. Post-humerals 2. Notopleurals 2. Supra-alars 1 : 2 : 2, a weak intermediate between anterior and median sets. Mesopleurals 1 anterior and a row of about 6 along posterior margin. Sternopleurals 1 : 2. No pteropleural. Scutellum, a basal and apical pair of strong marginals, the latter crossed. Two pairs of weak discals behind the apicals.

Abdomen: (Viewed from in front.) Apparent first segment yellowish-brown. Second and third yellowish-grey, with ill-defined lateral brownish spots, and a similar median area ill-defined in outline. Fourth segment with similar ground colour, but the two spots it bears rusty-yellow. The anterior half of the second segment may be concolorous with the first, as also the apical half of fourth. On second and third the median dark areas may be resolved into a pair of small admedian black spots on the anterior margins of the segments.

Legs: Yellowish-brown. Tarsi black.

Wings: Costal bristle none or very weak. Vein I ending just beyond anterior cross vein, which itself is just beyond the middle of the discal cell, IV changing direction at its insertion, its last section evenly curved, leaving first posterior as wide open as is the sub-costal cell. A few weak bristles on node of III above and below. Halteres yellowish.

Long: 6–6½ mm.

Described from two females in good condition, both taken at flowers of *Mikania scandens* at dusk, Sudu-ganga, Matale, Ceylon, on February 4, 1920 (type and co-type) in my own collection. A male, from the same place, taken on window, January 17, 1920, was sent to Dr. J. Villeneuve and is in his collection.

PROCEEDINGS OF THE CEYLON NATURAL HISTORY SOCIETY.

Forty-second General Meeting.

THE Forty-second General Meeting was held in the Colombo Museum Reading Room on Wednesday, October 25, 1922, at 5.45 P.M., Dr. A. Nell in the Chair.

A paper entitled "Fleas in relation to Plague" was read by Dr. L. F. Hirst.

Mr. C. T. Symons exhibited a fine collection of photographic enlargements illustrating animal life in the jungle.

Eleventh Annual General Meeting.

The Eleventh Annual General Meeting was held in the Colombo Museum Reading Room on Tuesday, February 20, 1923, at 5·30 P.M., Dr. A. Nell in the Chair.

The accounts and report of the Honorary Secretary and Treasurer for 1922 were read and confirmed.

The following Office-bearers were elected for the ensuing year :—

Patron : His Excellency the Governor.

President : The Hon. Mr. Cecil Clementi, C.M.G.

Vice-Presidents.—Very Rev. Father LeGoc., Mr. W. E. Wait, Dr. A. Nell, and Dr. Joseph Pearson.

Council : The Ven. F. H. de Winton, Dr. L. Nicholls, Hon. Mr. B. Horsburgh, and Messrs. W. W. A. Phillips, E. C. T. Holsinger, and C. T. Symons.

Honorary Secretary and Treasurer.—Mr. A. H. Malpas.

New Members.—Messrs. C. H. de Saram, S. R. de Silva H. G. Cornish, E. G. Nichols, and W. Richard de Silva.

A paper entitled "Ceylon Bats" was read by Mr. W. W. A. Phillips.

Forty-fourth General Meeting.

The Forty-fourth General Meeting was held in the Colombo Museum Reading Room on Wednesday, July 11, 1923, at 5.30 P.M.

Hon. Mr. C. Clementi in the Chair.

New Members.—Dr. H. U. Leembruggen, Mr. C. W. Sinclair, and Hon. Mr. E. B. Alexander.

Mr. W. E. Wait read a paper on "Oceanic Bird Wanderers to Ceylon."

Mr. George Brown read a paper on "Notes on Migrations, with reference to the Hill Zone of Ceylon."

Forty-fifth General Meeting.

The Forty-fifth General Meeting was held in the Colombo Museum Reading Room on Tuesday, October 2, 1923, at 5.30 P.M.

Dr. A. Nell in the Chair.

New Members.—Messrs. M. J. Cary, F. H. Layard, A. J. Hanscombe, F. O. Mackwood, Leslie Dow, Arthur S. Eaton, and Miss N. C. Carter.

A paper on "Snakes of Ceylon" was read by Mr. W. W. A. Phillips.

Forty-sixth General Meeting.

The Forty-sixth General Meeting was held in the Colombo Museum Reading Room on Tuesday, November 6, 1923, at 5.30 P.M.

Dr. A. Nell in the Chair.

New Members.—Messrs. S. D. J. Edward, F. L. C. Silva, C. H. Holmes, C. van Langenberg, J. T. C. Thambimuttu, W. J. E. Fernando, C. S. Senaveratne, J. A. Wijeyesinghe, S. Coomaraswamy, V. Ganeser, E. I. F. Fernando, S. M. Olegasegaram, D. Samson Senanayake, O. E. R. Abhayaratne, Chas. H. Pate, L. S. de Silva, Neil M. Fernando, L. J. H. Fernando, L. S. Williams, W. T. Chinniah, P. R. de Silva, H. L. H. de Mel, and E. A. Fonseka.

A paper on "Protozoology in relation to Medicine" was read by Dr. L. Nicholls.

Forty-seventh General Meeting.

The Forty-seventh General Meeting was held in the Colombo Museum Reading Room on Tuesday, December 4, 1923, at 5.30 P.M.

Dr. Joseph Pearson in the Chair.

New Member.—Mr. Eric C. K. Minor.

Mr. W. E. Wait read a paper on Dr. Willis's Book entitled "Age and Area" with relation to evolution and distribution of Species.

A. C. RICHARDS, ACTING GOVERNMENT PRINTER, COLOMBO, CEYLON.

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